Utilization of Behavioral Health Services among Medicaid-Eligible Women with Pre-Existing Psychiatric Disorders during the Perinatal Period

by

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Dedication

I would like to dedicate this dissertation first to my mother, Sumaya de Larach, for supporting me so I could pursue a dream. Second, to my friend Leon Edward Jablecki, who, with his unconditional friendship, kindness, and brilliance, supported my dreams and interests. Thank you, Leon and Sumaya.

Finally, this dissertation is dedicated to mothers with behavioral health challenges, who, through this process, I trust that I have given them a voice and advocated for systems to be more responsive to their unique needs.

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ABSTRACT

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Objective: Using Behavioral Model of Health Services Use (Andersen, 1995) as a theoretical framework, this study (a) examined the patterns behavioral health service utilization among Medicaid-eligible women with pre-existing psychiatric disorders and established behavioral health treatment, and (b) investigated the individual-level factors associated with behavioral health services pre-pregnancy, during pregnancy, and the postpartum period. *Methods:* Administrative data from Community Behavioral Health were used in a retrospective cohort study design. The study included 813 women who (a) delivered babies (live births) between January 1, 2008 and December 31, 2008, (b) were residents of Philadelphia County, (c) were Medicaid-eligible during some or all of the study period, between January 1, 2006 to December 31, 2009, (d) had a primary DSM-IV-TR diagnosis of attention-deficit/disruptive behavior disorder, substance-related disorder, schizophrenia/psychotic disorder, mood disorder, anxiety disorder, impulse control disorder, or adjustment disorder, and (e) had an established behavioral health treatment history prior to pregnancy. Generalized estimating equations (GEE) were used to examine associations between predisposing, enabling, and need factors and four types of behavioral health services: (a) outpatient use (use vs. non-use; (b) number of outpatient

visits; (c) inpatient use; and (d) number of inpatient days. *Results*: During pregnancy, rates of outpatient use decreased to 46%, but increased to 71% during the postpartum period. Similarly, rates of inpatient us decreased during pregnancy to 10%, but increased to 18% postpartum. Approximately 24% of the women made 35 or more outpatient visits, and 17% had 10 or more inpatient days. Predisposing (White and Hispanic race/ethnicity and older age), enabling (SSI without Medicare and days of Medicaid enrollment), and evaluated need (a mental health diagnosis) factors were associated with outpatient use. Predisposing (White race) and enabling (SSI without Medicare and days of Medicaid enrollment) factors were associated with the number of outpatient visits. Predisposing (White race) and enabling (days of Medicaid enrollment) factors were associated with inpatient use. The enabling factor, days of Medicaid enrollment, was associated with the number of inpatient days. *Conclusion*: Health insurance coverage via Medicaid was positively associated with behavioral health service use and intensity of use, but was not robust enough to decrease racial and ethnic disparities in behavioral health service use, suggesting an unmet need for behavioral health services among racial and ethnic minority perinatal women. Policy implications of these findings are discussed.

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CHAPTER 1

BACKGROUND AND LITERATURE REVIEW

Psychiatric Disorders among Perinatal Women

Psychiatric disorders disproportionally affect women (Kessler, 2001), particularly low-income women (Adelman, 2003; Miranda, Azocar, Kamaromy & Golding, 1998; Derr, Hill & Pavetti, 2001; Rosen, Tolman, Warner & Conner, 2007), and are more prevalent during their reproductive years, when they are more likely to be either pregnant or parenting (Grella, 1997; Hendrick, 2010; Kelly, Russo, Holt, Beate, Danielsen, Zatzick, Walker, & Katon, 2002). In the United States, it is estimated that in a twelve-month period, over 500,000 pregnancies involve women with pre-existing psychiatric disorders or women who develop psychiatric symptoms during pregnancy (American College of Obstetricians and Gynecologists [ACOC], 2008). One study, for example, found that 10% of pregnant women and 13% of those who have given birth experienced a psychiatric disorder (O'Hara and Swain, 1996).

Although the prevalence of psychiatric disorders during pregnancy and the postpartum period is well established (Pollack, Segre, O'Hara, & Stuart, 2011; Gavin et al., 2005), wide variations in prevalence estimates exist (Kalra & Einarson, 2010; Abramowitz, Larsen & Moore, 2010). One explanation for the variability in prevalence estimates is that studies assess women at different points in time (Kalra and Einarson, 2010; Abramowitz, Larsen & Moore, 2010), with the postpartum period predicting higher prevalence rates (O'Hara & Swain, 1996). For example, in a meta-analyses comparing rates of perinatal depression with that of depression in women at non-childbearing times, Gavin et al. (2005) found that for major and minor depression, the combined point prevalence

ranged from 6.5% to 12.9% (1.0% to 5.6% for major depression) at different trimesters of pregnancy and months in the postpartum year, and the combined period prevalence was 19.2% for a depressive disorder (7% for major depression) during the three months postpartum, with most having its onset following delivery. However, because the estimates had wide 95% confidence intervals, the results were inconclusive. Another explanation for the variability in prevalence estimates is that the screening, assessment, and diagnostic instruments utilized in these studies vary in sensitivity, affecting prevalence rates (Abramowitz, Larsen & Moore, 2010; O'Hara & Swain, 1996).

Similarly, studies using nationally representative samples of pregnant and postpartum women in the United States have reported wide variations in prevalence estimates of psychiatric disorders. In a study to estimate the prevalence of twelve-month and lifetime psychiatric disorders among Medicaid or Medicaid-eligible pregnant women enrolled in the Special Supplemental Nutrition Program for Women, Infants and Children (WIC) program, Cook, Flick, Homan, Campbell and Gallagher (2010) reported the twelve-month prevalence of one or more psychiatric disorders to be 30.9%. The most common psychiatric disorders were affective disorders (13.6%), particularly major depressive disorder (8.2%) and bipolar I disorder (5.2%). With respect to the lifetime prevalence, 45.6% of the sample had at least one psychiatric disorder, with affective disorders being the most common (23.5%). In another nationally representative sample of pregnant and postpartum women in the United States, Vesga-López, Blanco, Keyes, Olfson, Grant, and Hasin (2008) found prevalence rates of *Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition* (DSM-IV) psychiatric disorders ranging from 0.4% for any psychotic disorders to 15% for substance abuse. The 2009 National Survey on Drug Use and Health (NSDUH) reported prevalence rates of alcohol and illicit drug use among postpartum women ranging from 3.8% for marijuana use to 32% for alcohol use.

While these studies provide rich descriptive data, they are limited in that they focus on household population, which exclude and/or underrepresented populations with high rates of severe and persistent mental illness, such as the homeless and people living in institutions (Kessler & Wang, 2008; Rosen, Tolam, Warner & Conner, 2007). Additionally, survey non-response or non-reporting yield biased estimates of disorder prevalence or unmet need for treatment, which limits their ability to inform policy or program development (Kessler & Wang, 2008; Rosen, Tolam, Warner & Conner, 2007).

Psychiatric Disorders among Women of Reproductive Age - A Public Health Problem

Psychiatric disorders among women of reproductive age are a significant public health concern. Psychiatric disorders among these women are associated with adverse maternal, infant, and family outcomes. Mood disorders (major depression and bipolar) during pregnancy, for example, are associated with preterm delivery, low birth weight, smaller head circumference, low Apgar scores, higher rates of admission to neonatal intensive care units, postpartum depression (Cohen & Nonacs, 2005; Bloch, Rotenberg, Koren, & Klein, 2005; ACOG, 2008), and depression or diminished emotional well-being in the women's partner (Arnold, 2009). Low birth weight, prematurity, and other perinatal complications may result in delays or deficits in an offspring's cognitive and motor development (Brunette & Jacobsen, 2010), short-and long-term risk of psychiatric or behavioral disorders, such as Attention Deficit Hyperactivity Disorder (Grace, Evindar, & Stewart, 2003; Downey & Coyne, 1990; Weissman, Wickramarante, Nomura, Warner, Pilowsky, & Verdeli, 2006), and other medical complications (Weissman et al., 2006; Brunette & Jacobsen, 2010). Anxiety disorders are associated with increased incidence of forceps deliveries, prolonged or precipitate labor, fetal distress, and spontaneous abortion (ACOG, 2008). Substance

use during pregnancy is associated with toxemia of pregnancy, abruptio placenta, low birth weight, preterm delivery, and stillbirth delivery (Kelly et al., 2002; Messer, Clark, & Martin, 1996).

Psychiatric symptoms may also affect a woman's ability to parent (Brunette & Jacobsen, 2010). While women with psychiatric disorders, and similar to women in the general population, demonstrate varied parenting styles and skills (Brunette & Jacobsen, 2010), women with psychiatric disorders are more likely than women without psychiatric disorders to exhibit problematic parenting behaviors, including negative, disengaged, or withdrawn parenting (National Academy of Science[NAS], 2008), lower levels of attentiveness, higher levels of tension, intrusiveness, or criticism (Weinberg & Tronick, 1998 [as as cited in Brunette & Jacobsen, 2010]; Cohler & Musick, 1983; White & Barrowclough, 1998). Lovejoy, Graczyk, O'Hara, and Newuman (2000, as cited in Brunette & Jacobsen, 2010) conducted a meta-analysis of studies of parenting behavior in women with depressive disorders and found that approximately one-fourth to one-half of the studies reported a small to moderate effect in the expected direction of increased negative and disengaged maternal behaviors as well as reduced positive maternal behaviors with children. The effects, however, were larger in mothers of infants than in mothers of preschoolers and school-aged children. Other studies suggest that when a mother's illness is more severe and chronic, parenting may be more seriously impaired than when the illness is less severe or responds rapidly to treatment (Sameroff, Seifer & Zax, 1982; Uddenberg & Engelsson, 1978).

Maternal psychiatric symptoms are also associated with child abuse, neglect, and safety concerns. Women with psychotic symptoms, for example, may experience delusions about their children or thoughts or impulses to harm their children (Seeman, 2010). Impulses to harm that are based on delusions may result in violence toward children, which has been reported in several studies to occur in approximately one to 12.8% of women with severe psychiatric disorders (DaSilva

& Johnstone, 1981; Davidson & Roberston, 1985). Impulses to harm, however, are usually time-limited and responsive to treatment, and not indicative of a woman's overall parenting abilities. Other maternal psychiatric disorders, such as schizophrenia, have been associated with child protective services involvement. In a study to determine the association between maternal mental illness (schizophrenia and major affective disorders) and child custody arrangements in a sample of Medicaid-eligible mothers in Philadelphia, Pennsylvania, Park, Solomon, and Mandell (2006) found that after adjusting for race/ethnicity, age, and type of psychiatric treatment received, mothers with a serious mental illness were almost three times as likely as other mothers without serious mental illness to have contact with the child welfare system or to have lost custody of their children, with psychiatric inpatient hospitalization increasing the risk for these negative outcomes. However, this study did not account for substance use, a factor that increases the risk for involvement in the child welfare system.

Risk Factors for Psychiatric Disorders during the Perinatal Period

The Perinatal Period as a Risk Factor: For women with pre-existing psychiatric disorders, particularly severe psychiatric disorders, the perinatal period, that is, pregnancy to the end of the first year postpartum (Austin, Kildea & Sullivan, 2007), is a period of increased vulnerability. During this period, women with pre-existing psychiatric disorders are at an increased risk for relapse, recurrence, or exacerbation of psychiatric symptoms (Bennett, Marcus, Palmer, & Coyne, 2010; Hendrick, 2006; Solari, Dickson &Miller, 2009; Howard, Goss, Leese, Appleby, & Thornicroft, 2004; Wisner, Chambers & Sit, 2006; Mowbray, Oyserman, Zemencuk, & Ross, 1995). In a recent prospective study to estimate the risk of recurrence of bipolar disorder during pregnancy in women who discontinued or continued the use of a mood stabilizer, Viguera et al. (2007) found that 70.8 %

of the women experienced at least one episode of illness during their pregnancy, with those who discontinued the medication spending over 40% of their pregnancy in a mood episode (compared to 8.8%. of those who continued their medication). Additionally, bipolar disorder has an increased risk for relapse during the postpartum period (Burt & Hendrick, 2005). Approximately 20% to 80% experience a relapse, and 10% to 20% experience postpartum psychosis, which has been associated with suicide and infanticide (Burt & Hendrick, 2005; Yonkers et al., 2004). Similarly, schizophrenia has a high risk of relapse during the perinatal period (Frieder, Dunlop, Culpepper, & Bernstein, 2008). In a study of mothers with schizophrenia, Howard et al. (2009) found that 55% of the mothers experienced a psychiatric episode during the first year postpartum, usually in the first three months, and were more likely to be depressed than controls.

For women with substance-related disorders, pregnancy is one of the most challenging times in a woman's life cycle (The National Center on Addiction and Substance Abuse [CASA], 2006). Pregnancy and the postpartum period are periods of physiologic, hormonal, and psychologic change (Anderson et. al., 2003), and women who use smoking, drinking, or illicit substances as coping mechanisms for stress and other emotional experiences, find ceasing substance use difficult (CASA, 2006). Additionally, women with histories of mental illness are at an increased risk of engaging in substance use during pregnancy (Hans, 1999). In a study by Haug (2003, as cited in CASA, 2006), women in treatment with a history of depression were more likely to increase smoking during pregnancy than those who had no such history. Another study found that 21% of depressed women (compared with 5% of non-depressed women) had a least one binge-drinking episode during pregnancy (CASA, 2006).

These collective data point to the importance of recognizing pregnancy and childbirth as health factors in the life cycle of women, when they may be more susceptible to complications

arising from psychiatric disorders (Almond, 2009; Hendrick, 2010). Pregnancy and childbearing appear to influence the course of an illness or precipitate new episodes of illness (Winser et al., 2006), challenging the "so-called protective effect of maternity" (Oates, 2003, p.219). Accordingly, psychiatric morbidity has been identified as the primary cause of maternal morbidity and mortality during the perinatal period. The 1997 to 1999 Confidential Enquiry into Maternal Deaths in the United Kingdom, for example, found that psychiatric disorders were the primary cause of maternal death, with suicide accounting for 28% of all of the deaths (Oates, 2003). Interestingly, the majority of suicides were completed in a violent manner, challenging the usual finding that women die from an overdose of medication (Oates, 2003). Thus, the risk profile for women during the perinatal period, particularly during the postpartum period, may be very different to that in women at other times in their life cycle (Oates, 2003).

Risk Factors: Numerous studies have provided information about the factors that account for the increased risk of mental health and substance use disorders during the perinatal period. In a meta-analyses of risk factors for depression during pregnancy that can be assessed in routine obstetric care, Lancaster, Gold, Flynn, Yoo, Marcus, and Davis (2010) found that maternal anxiety, life stress, history of depression, lack of social support, unplanned pregnancy, Medicaid insurance, domestic violence, lower income, smoking, single status, and poor relationship status were associated with a greater likelihood of depression during pregnancy. However, in the multivariate analyses, life stress, lack of social support, and domestic violence continued to demonstrate significant association. Other risk factors for depression in pregnancy include first pregnancy, physical discomfort, and previous stillbirth, and substance abuse/dependence (Collins et al., 1993; Burger, Horowitz, Forsyth, Leventhal, & Leaf, 1993; Hughes, Turton, & Evans, 1999; Kalra & Einarson, 2010). In a study examining the prevalence of postpartum depression as a function of

income, education, and occupational prestige, Segre, O'Hara, Arndt, and Stuart (2007) found that lower income and lower occupational prestige, younger age, being single, and having more children were associated with increased risk for depression. However, when controlling for other demographic variables, income was the most robust predictor. Other risk factors for postpartum depression include a history of depression (of women who present with post partum depression, 20% to 30% have had a previous episode of major depression [O'Hara et al., 1991]), depression during pregnancy, history of severe premenstrual dysphoria, family history of mood disorder, child-care stress, lack of social support, marital discord, prenatal anxiety, marital problems, and difficult or unpredictable infant temperament (Epperson & Ballew, 2010). For anxiety disorders, risk factors include lower socioeconomic status, poor martial relationship, traumatic labor, personal of family history of anxiety, and partner who is experiencing a psychiatric disorder (Wenzel, Haugen, Jackson, & Brendle, 2005 [as cited in, Abramowitz, Larsen, & Moore, 2010]; Matthey, Barnett, Howie, & Kanavagh, 2003; [as cited in, Abramowitz, Larsen, & Moore, 2010]).

Among women who use or abuse alcohol and other substances during pregnancy, risk factors include mental illness, particularly depression, homelessness, low education, poverty, unemployment, public assistance, domestic violence, sex work, negative feelings about being pregnant (CASA, 2006; Jones, Tran, & Svikis, 2004; Webb, Cullhane, Metraux, Robbins, & Cullhane, 2001; Allen, Prince, & Dietz, 2009; Havens, Simmons, Shannon, &Hansen, 2009). Homeless pregnant substance abusers experience multiple challenges. Compared to pregnant substance abusers with housing, homeless pregnant women have greater addiction severity, more medical problems, less social support, higher family conflict, and a higher prevalence of psychiatric illness and sexual abuse (Tuten, Jones, & Svikis, 2003).

Few studies have examined the relationship among pre-pregnancy, pregnancy and postpartum mental health. One such study, drawing upon the framework of perinatal health, which integrates the life course developmental perspective with a model of health determinants, hypothesized that perinatal health is influenced by both cumulative effects of events across the lifespan and intergenerational effects, and health factors before and during pregnancy have an important impact on having poor postpartum mental health (Witt et al., 2011). Using data from the household component of the 1996-2006 Medical Expenditure Panel Survey (MEPS) to examine whether pregnancy mental health status mediates the relationship between pre-pregnancy and postpartum mental health problems, Witt et al. (2011) found that 9.5% of women in the United States reported poor postpartum mental health. Compared with women without postpartum mental health problems, women with postpartum mental health problems were less likely to be married and more likely to be divorced, separated, or widowed, to be without a high school education, have a pregnancy complication, have a chronic medical condition, report substance abuse, report smoking during pregnancy, rate their physical health status during pregnancy as "fair" or "poor," live below 100% of the federal poverty threshold, and have publicly funded insurance. Additionally, women who had both poor pre-pregnancy and pregnancy mental health had higher odds of poor postpartum mental health.

Given that perinatal health is influenced by both cumulative effects of events across the lifespan and intergenerational effects, and health factors before and during pregnancy have an important impact on having poor postpartum mental health, it has implications for clinical and public health interventions. More specifically, it suggests that reducing the number of risk factors can help the mother, and ultimately her offspring, and that not all risk factors need to be removed to alter a mother's or a offspring's trajectory in life (Brunnette & Jacobsen, 2010).

Behavioral Health Service Utilization during the Perinatal Period

In addition to being a period of increased vulnerability, the perinatal period is disruptive to treatment (Bennett, Marcus, Palmer & Coyne, 2010; Rosen, Tolman, & Warner, 2003). Pregnancy, childbirth, and/or the responsibility of caring for children affect a woman's propensity to receive services (Rosen, Tolman, & Warner, 2003). Studies that have examined service utilization patterns among perinatal women report unfavorable or troubling patterns of use, which is a public health concern. Few women seek, receive, or continue behavioral health treatment during the perinatal period (Vega-López et al., 2008; Bennett et al., 2010; Smith, Shao, Howell, Wang, Poshman, & Yonkers, 2009; Flynn, Blow, & Marcus, 2009), particularly low-income and minority women (Kurz, 2005; ; Kozhimannil, Trinacty, Busch, Huskamp, & Adams, 2011; Cook, Flick, Homan, Campbell, & Gallagher, 2010; Bennett et al., 2010; Song, Sands, &Wong, 2004).

In a cohort study across fifty U.S. states to examine whether pregnancy was associated with discontinuation of antidepressant use and depression care visits among Medicaid recipients, Bennett et al. (2010) found that compared with the control group, women who became pregnant significantly reduced their ongoing depression care (any care), and this pattern continued in the postpartum period. White women had a greater reduction in care visits during pregnancy than pregnant non-white women, and pregnant non-white women had significantly greater reduction in antidepressant use during pregnancy than white pregnant women. This finding was similar to that reported by Kozhimannil et al. (2011) and by Song, Sands, &Wong (2004). In a retrospective cohort study focusing on postpartum depression care among Medicaid recipients in the state of New Jersey, Kozhimannil et al. (2011) found that after controlling for demographic and clinical factors, the odds of initiating any treatment remained significantly ($p<.001$) low for Black and Latina women,

compared with whites. Among those who initiated treatment, Blacks and Latinas were less likely than whites to have any follow-up treatment or to continue treatment. With respect to treatment modality, compared with white women, black women receiving treatment had higher odds of having an outpatient mental health visit, but lower odds of filling or refilling an antidepressant prescription, similar to Latina women. Similarly, in a study of perinatal women receiving Medicaid benefits in Philadelphia, Pennsylvania, Song, Sands, and Wong (2004) found no differences between whites and blacks with respect to services use across settings, but did with respect to medication use. Whereas one in five Whites who had any disorder assessed in the past twelve months were taking psychotropic medication, one in ten Blacks were taking psychotropic medication. Additionally, sixty percent of the women receiving mental health services during pregnancy did not resume services postpartum.

In contrast, Dietz, Williams, Callaghan, Bachman, Whitlock, and Hornbrook (2007) and Wolfe, Guydish, Santos, Delucchi, and Gleghorn (2007) found higher rates of treatment, particularly in the postpartum period. Using administrative data from Kaiser Permanente Northwest (Washington and Oregon) to identify maternal depression before, during, and after pregnancy among a cohort of predominantly White women, Dietz et al. (2007) found that antidepressant use was the most common form of treatment, and although antidepressant use decreased during pregnancy, it resumed and even exceeded pre-pregnancy levels postpartum. Focusing on pregnant and parenting women with illicit substance use in San Francisco, California, Wolfe, Guydish, Santos, Delucchi, and Gleghorn (2007) found that while during pregnancy there was a significant decrease in outpatient and detoxification services, methadone maintenance and residential treatment services significantly increased. During the postpartum, the use of outpatient service increased, methadone maintenance decreased, and detoxification and residential services remained unchanged. These

findings underscore the need to screen pregnant women for substance use to engage them in treatment.

These collective data are rather remarkable given that in the United States, most pregnant and postpartum women have health insurance coverage and increased contact with the health care system, both of which are well documented mediators of treatment, suggesting the existence of unique barriers to the initiation or continuation of behavioral health treatment for this population (Vega-López et al., 2008; Kopelman et al., 2008; Alvidrez & Azocar, 1999).

Barriers to and Facilitators of Behavioral Health Treatment during the Perinatal Period

Perinatal women face unique barriers that may deter them to seek treatment or to discontinue treatment, including stigma (Campbell, Alexander, & Lemak, 2009), lack of child care, lack of transportation, fear of losing custody of their children (Nicholson & Biebel, 2002; Nicholson, Sweeney, & Geller, 1998), lack of available and accessible specialized, coordinated, and evidence-based perinatal psychiatric services (Bullard, Meltzer-Broody, & Rubinow, 2009; Freeman, 2008), and clinical dilemmas related to possible teratogenic effects, as data is at best tentative and often conflicts with other data (Freeman, 2008; Bennett et al., 2010; Cullen, Matejkowsli, Marcus, & Solomon, 2010; Nicholson & Biebel, 2002; Kopelman et al., 2008).

Numerous studies have identified some of the factors that impede or facilitate a woman's use of behavioral health services during the perinatal period. In qualitative study to examine obstetricians' and gynecologists' perceptions of accessing pharmacotherapy for perinatal depression outside the obstetric setting, Byatt et al. (2012) identified discontinuation of psychotropic medications by community mental health providers or the women themselves, lack of collaboration

and communication with community mental health providers, and pharmacists refusing to fill prescription (or pharmacists suggesting not take the medication because they are pregnant) as barriers to pharmacological treatment. Facilitators included greater communication between community mental health and obstetric providers (e.g., multidisciplinary discussion about the risks and benefits of psychotropic medication in perinatal women) and continuity of care with community mental health providers. In another qualitative study among low-income, urban, perinatal African-American clients of home visiting programs, Leis, Mendelson, Perry, and Tandon (2011) found perceptions of mental health services to be impediments of service use. Many of these women associated seeing a mental health care provider with being prescribed psychotropic medication and perceived psychotherapy as ineffective. Another prospective study to evaluate mental health-care utilization among perinatal women receiving care from publicly funded obstetric clinics, Smith et al. (2009) found that the most robust predictors of treatment attendance were history of mental health treatment and location of behavioral health referral. Women who were referred to a behavioral health provider located at the same site as their prenatal or postpartum care were four times more likely to attend treatment than those referred to a behavioral health provider at a different location, underscoring the need for coordinated services. Other predictors of treatment attendance included presence of other children in the household, history of mental health diagnosis, number of co morbid psychiatric disorders, and interpersonal violence. These findings were consistent with other research studies. Messer et al. (1996), for example, found that compared with pregnant women who declined treatment for substance use, women who accepted treatment were more likely to have a greater number of children, more substance abuse problems, past treatment for substance abuse, and a history of physical and/or sexual violence during pregnancy. In a qualitative study to identify factors that influence depression treatment during the perinatal period, Flynn, Henshaw, O'Mahen, and

Forman (2010), found that women reported a strong preference for treatment provided in the obstetric clinic or in the home. In a study of low-income pregnant and post partum women, Song, Sands and Wong (2004) found that African-American women had a 50% lower probability of using mental health services than White women. Age and number of children were also associated with service use in this study, with older women and women with a greater number of children more likely to use services.

Limitations of Existing Literature

The aforementioned literature underscores the importance of recognizing pregnancy and childbirth as health factors in the life cycle of women, when they are more vulnerable to psychiatric disorders and to complications arising from psychiatric disorders. At the same time, this literature review also supports the potential treatment has in maximizing maternal functioning and childrearing abilities and in mitigating the adverse effects on the development of the offspring and the family. For these reasons, it is important to explore the utilization of behavioral health services among this high risk population. Most studies of utilization of behavioral health services among perinatal women, however, have focused on the prevalence and symptoms of psychiatric disorders (Vega-López et al., 2008; Pollack, Segre, O'Hara, & Stuart, 2011; Gavin et al., 2005; Birndorf , Madden, Portera, & Leon, 2001; Kelly, Zatzick, & Anders, 2001; Wenzel, Haugen, Jackson, & Brendle, 2005; Matthey, Barnett, Howie, & Kanavagh, 2003), and do not provide information on the extent to which behavioral health service utilization patterns differ during pregnancy and the postpartum period (Songs, Sands, & Wong, 2004). Additionally, these studies are limited in their ability to inform policy or program development for this population (Kessler & Wang, 2008; Rosen, Tolman, Warner, & Conner, 2007). Studies that have provided information on patterns of behavioral health use during pregnancy and postpartum have specifically focused on women with depressive disorders

(Bennett et al., 2010; Flynn, Blow, & Marcus, 2009; Kozhimannil et al., 2011; Dietz et al., 2007), probably because affective disorders are common among women of reproductive age (Kessler, 2001), or White middle class women with depressive disorders (Dietz et al., 2007), to the exclusion of women with a broader range of psychiatric disorders, including women with severe psychiatric disorders (e.g., schizophrenia or bipolar disorder), and low-income and minority women who are perhaps among the most vulnerable to psychiatric complications during the perinatal period (Dunlop et al., 2008; ACOC, 2008; Rosen, Tolman, Warner, & Conner, 2007). Additionally, among these studies, few have employed a theoretical framework to understand factors associated with behavioral health service use during the perinatal period, or have included information about behavioral health service use pre-pregnancy, with most studies focusing on behavioral health service use during pregnancy or the postpartum period only (Kozhimannil et al., 2011).

This study will add to the extant literature on women's mental health service research by examining the patterns of behavioral health service utilization among Medicaid-eligible women with pre-existing psychiatric disorders in relation to time period (pre-pre-pregnancy, during pregnancy, and postpartum), and in relation to intensity of use, a more robust indicator of disease burden (Elhia &Ford, 2007). By including pre-pregnancy service use data, this study will explore time-specific relationships between the need for services and actual use of services (Elhia &Ford, 2007). Additionally, this study will add to the literature on public mental health policy by exploring demographic, health insurance coverage, and need-based factors that influence or facilitate use of behavioral health services among perinatal women enrolled in Medicaid managed care settings.

Theoretical Framework: The Behavioral Model of Health Services Use

Conceptually, this study was guided by the Behavioral Model of Health Services Use (Andersen, 1974; Andersen & Newman, 1973; Andersen, 1995). The model was originally developed in the 1960s (Figure) to understand how and why families use health services, to define and measure equitable access to health care, and to develop policies to promote equitable access (Andersen, 1974). The theory hypothesizes that individuals' utilization of health services is a function of their predisposition to use services (predisposing factors), factors which facilitate or impede use (enabling factors), and their need for care (perceived or evaluated need) (Andersen, 1995).

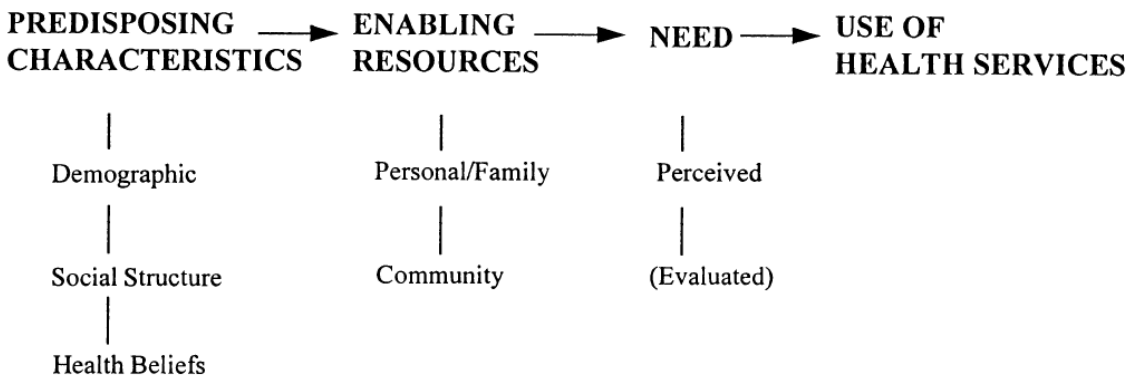

Figure 1: The 1960s Behavioral Model of Health Services Use (Andersen, 1995, p.2)

Predisposing characteristics are existing conditions that predispose individuals to use or not use services, but are not directly responsible for the use. These include demographics factors, social structure, and health beliefs (Andersen, 1995). Demographic characteristics such as age and gender

are “biological imperatives suggesting the likelihood that people will need services” (Hulka and Wheat, 1985, in Andersen, 1995, p.2). Social structure characteristics include factors that determine an individual’s position in the community, as well as how healthy or unhealthy is the physical environment. Measures of social structure include ethnicity, education, and occupation. Health beliefs are “attitudes, values, and knowledge that people have about health and health services that might influence their subsequent perceptions of need and use of health services” (Andersen, 1995, p.2). Thus, health beliefs explain how social structure influences enabling resources, perceived need, and subsequent use (Andersen, 1995)

Enabling factors are conditions that facilitate or hinder the use of services. For use to take place, however, personal, family, and community enabling resources must be present (Andersen, 1995). That is, health care facilities must be available in communities where individuals reside, and individuals must have “the means and know-how to get to those services and make use of them” (Andersen, 1995, p.3). Measures of this component include family income, health insurance, regular source of care, place of residence, and region of the country (Andersen, 1978).

Measured as either perceived or evaluated need, need factors represent “the most immediate cause of health service use” (Andersen, 1978. p.17). Perceived need represents individuals’ perception of their own health and how they experience illness, which might be explained by social structure and health beliefs. Evaluated need, on the other hand, represents a “professional judgment about people’s health status and their need for medical care” (Andersen, 1995. p.3). Similar to perceived need, it has a social component which varies with changes in the field of medicine and according to the training and competency of the professional. The model hypothesizes that perceived need will better explain care-seeking and adherence to treatment, and evaluated need will better explain the type and amount service to be provided (Andersen, 1995). Health service use was the

outcome of the original model, and was measured in units of physician ambulatory care, hospital and physician inpatient services, and dental care, which families utilized over a year's time (Andersen, 1995).

Revisions of the model have expanded its scope to include contextual determinants to health services use (Figure 2) (Andersen & Davidson, 2001), but the emphasis has remained on the health behaviors of individuals, in particular, their use of health services. Contextual determinants refer to the circumstances and environment of health care, including health organization, provider-related factors, and community characteristics (Andersen & Davidson, 2001). Similar to individual characteristics determining access in the original model, contextual characteristics are divided into predisposing, enabling, and need factors (Andersen & Davidson, 2001).

Contextual predisposing determinants include demographic, social, and beliefs characteristics. Demographic components include age, gender, and marital composition of a community. Social characteristics describe how supportive or detrimental the communities where individuals reside and work might be to their health and access to health services.

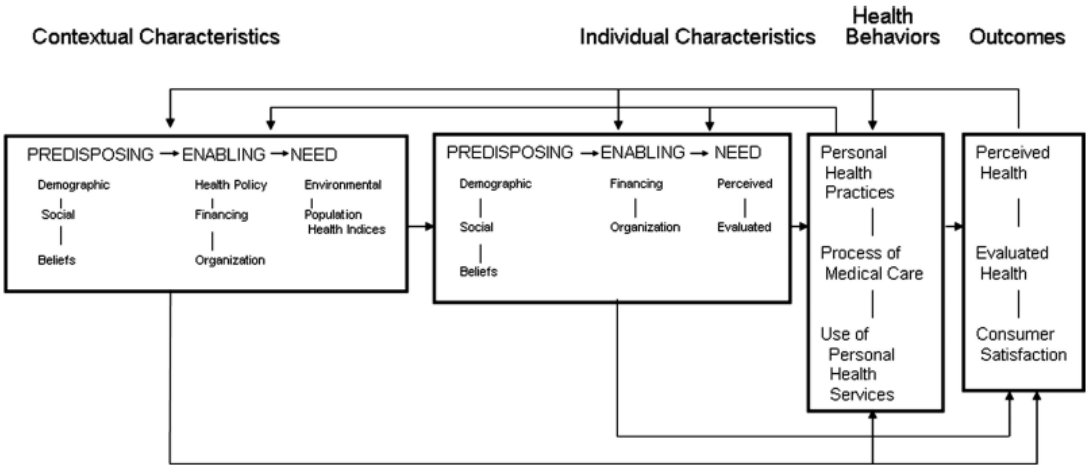

Figure 2: A Behavioral Model of Health Services Use Including Contextual and Individual Characteristics (Andersen and Davidson, 2001, p.4)

Measures of social characteristics include educational levels, ethnic and racial composition, proportion of recent immigrants, employment levels, and crime rates (Andersen and Davidson, 2001). Beliefs refer to community or organizational values and cultural norms, as well as "political perspectives regarding how health services should be organized, financed, and made accessible to the population" (Andersen & Davidson, 2001, p.6).

Contextual enabling characteristics include health policies, financing, and organization. Health policies are "authoritative decisions made pertaining to health or influencing the pursuit of health" (Andersen & Davidson, 2001, p.6). These include policies made in the public and private sectors, such as a decisions made at the local or national level by the legislative, executive or judicial level branches of government, or decisions made by executives of managed care companies, or accrediting bodies. Financing characteristics include resources to pay for health services (e.g., community income) or incentives to purchase or provide health services (e.g., rate of health insurance). Organization refers to the amount of and distribution of health services facilities and personnel and how they are structured to offer services.

Contextual need characteristics include environmental and population health indices factors. Environmental factors include health-related measures of the physical environment, such as the quality of housing and injury and death rates. Population health indices include general and condition-specific rates of mortality, mortality, and disability in the community.

The Behavioral Model of Health Service Use therefore can be utilized to both organize determinants of service utilization and to promote equitable access to improve health outcomes. To promote equitable access, however, the variable must be considered mutable; that is, to have the

potential to be altered to influence the distribution of services or to "point to policy changes that might bring about behavioral change" (Andersen, 1995, p.5). Demographic factors, such as gender and age, for example, are considered to have low mutability, for gender and age cannot be altered to influence utilization (Andersen, 1995). Health beliefs, on the other hand, are considered to have medium mutability, for they can be altered to effect behavioral change (Andersen, 1995). Accordingly, predisposing, enabling, and need factors have the ability to both predict and explain use. Independently, these factors might predict use, but as explanatory or causal, "predisposing factors might be exogenous, some enabling resources might be necessary but not sufficient conditions for use, and some need must be defined for use to actually take place" (Andersen, 1995, p.1-2).

With respect to the extent to which each set of predisposing, enabling, and need variables has the ability to predict and explain behavioral health service use, prior research studies have consistently documented that need variables have the most robust effect on the different patterns of behavioral health utilization (Albizu-Garcia, Alegría, Freeman, & Vera, 2001; Elhia & Ford, 2007; Elhai, Voorhees, Ford, Min & Frueh, 2009; Flaskerud & Hu, 1992; Katz, Kessler, Frank, Leaf, Lin & Eldund, 1997; Rosen Tolman, & Warner, 2004; Song et al., 2004). Need factors, particularly evaluated need (objective need for treatment [Elhia &Ford, 2007]), evidence stronger effects on professional help-seeking for psychiatric disorders (Lewis, Resnick, & Ruggierro, 2005; Bland, Newman, & Orn, 1997; Elhai & Ford, 2007; Rothbard, Schinnar & Adams, 1996; Grella, Karno, Warda, Moore, & Niv, 2009), on continuation in treatment (Rothbard et al., 1996; Elwy, Ranganathan, & Eisen, 2008), on greater service use (Elhia & Ford, 2007; Fikretoglu, Elhai. Liu, Richardson, & Pedlar, 2009; Elwy et al.,, 2008; Song et al., 2004; Katz et al., 1997; Flaskerud & Hu,

1992), and intensity of use (Elhia & Ford, 2007; Fikretoglu et al., 2009; Rothbard et al., 1996; Rothbard & Schinnar, 1996; Flaskerud & Hu, 1992).

Conversely, predisposing and enabling variables have yielded inconsistent findings in explaining and predicting variation in behavioral health service utilization (Padgett, Patrick, Burns, & Schlesinger, 1994; Lemming & Caslyn, 2004; Elhia & Ford, 2007; Elwy et al., 2008). For example, race/ethnicity has been an inconsistent predictor of use of behavioral health services, with some studies finding that whites use more services, while other studies report that African-Americans use more services, and others reporting no significant differences between whites and ethnic minorities (Padgett et al., 1994; Lemming & Caslyn, 2004; Elhia & Ford, 2007; Elwy et al., 2008; Wells, Golding, Hough, et al., 1988 in Padgett et al., 1994).

CHAPTER 2

METHODS

This chapter describes the methodology utilized to address the following research questions of this study: (a) What are the patterns of behavioral health service utilization among Medicaid-eligible women known to the City of Philadelphia Department of Human Services with pre-existing psychiatric disorders pre-pregnancy, during pregnancy, and postpartum?; (b) Are individual predisposing, enabling, and evaluated need factors associated with outpatient use and the number of outpatient visits?; and (c) Are individual predisposing, enabling, and evaluated need factors associated with inpatient use and the number of inpatient days?

Study Population

The purpose of this quantitative retrospective cohort study was to explore the patterns and factors associated with behavioral health service utilization among Medicaid-eligible women with pre-existing psychiatric disorders and established psychiatric treatment at three distinctive periods: (a) pre-pregnancy (one year prior to pregnancy), (b) pregnancy (nine months prior to delivery), and (c) postpartum (one year after delivery). Accordingly, the coverage years for this study ranged from January 1, 2006 to December 31 2009.

The study sample was comprised of $N = 813$ women who were residents of Philadelphia County who (a) were Medicaid-eligible during some or all of the study period (January 1, 2006 to December 31, 2009); (b) had a primary DSM-IV-TR diagnosis of attention-deficit/disruptive behavior disorder, substance-related disorder, schizophrenia/psychotic disorder, mood disorder,

anxiety disorder, impulse control disorder, or adjustment disorder; (c) had an established behavioral health treatment history prior to pregnancy; and (d) delivered babies (live births) between January 1, 2008 and December 31, 2008. The sample selection process is presented in Figure 1.

The population of women from which the sample (N = 813) for the study came were 2,480 women identified as being the mothers of Medicaid-eligible children born in 2008 in Philadelphia, Pennsylvania, as documented by Community Behavioral Health's (CBH) Medicaid eligibility file. In CBH's Medicaid eligibility file, the Medicaid-eligible children identified as being born in 2008 (21,300) included duplicates for newborn children that were not assigned a name at the point of coverage, but later their eligibility was updated with their birth names resulting at times as separate numbers. Consequently, it was necessary to match the mothers of the Medicaid-eligible children by matching child to mother data in the data maintained in the Philadelphia Department of Human Services (DHS) of the City of Philadelphia Cross-Agency Response for Effective Services (CARES) database. The CARES database returned data on 2,480 mothers with a history of CBH eligibility who had 2,580 distinct children. Of these 2,480 CBH-eligible mothers, only 1833 were Medicaid eligible during the three periods (pre-pregnancy, during pregnancy, and post-partum), between January 1, 2006 to December 31, 2009. Of the 1833 mothers who met eligibility criteria, 813 had histories of behavioral health service use based on claims data from Community Behavioral Health and the Philadelphia Behavioral Health Initiative. Thus, only 813 mothers met the study's eligibility criteria.

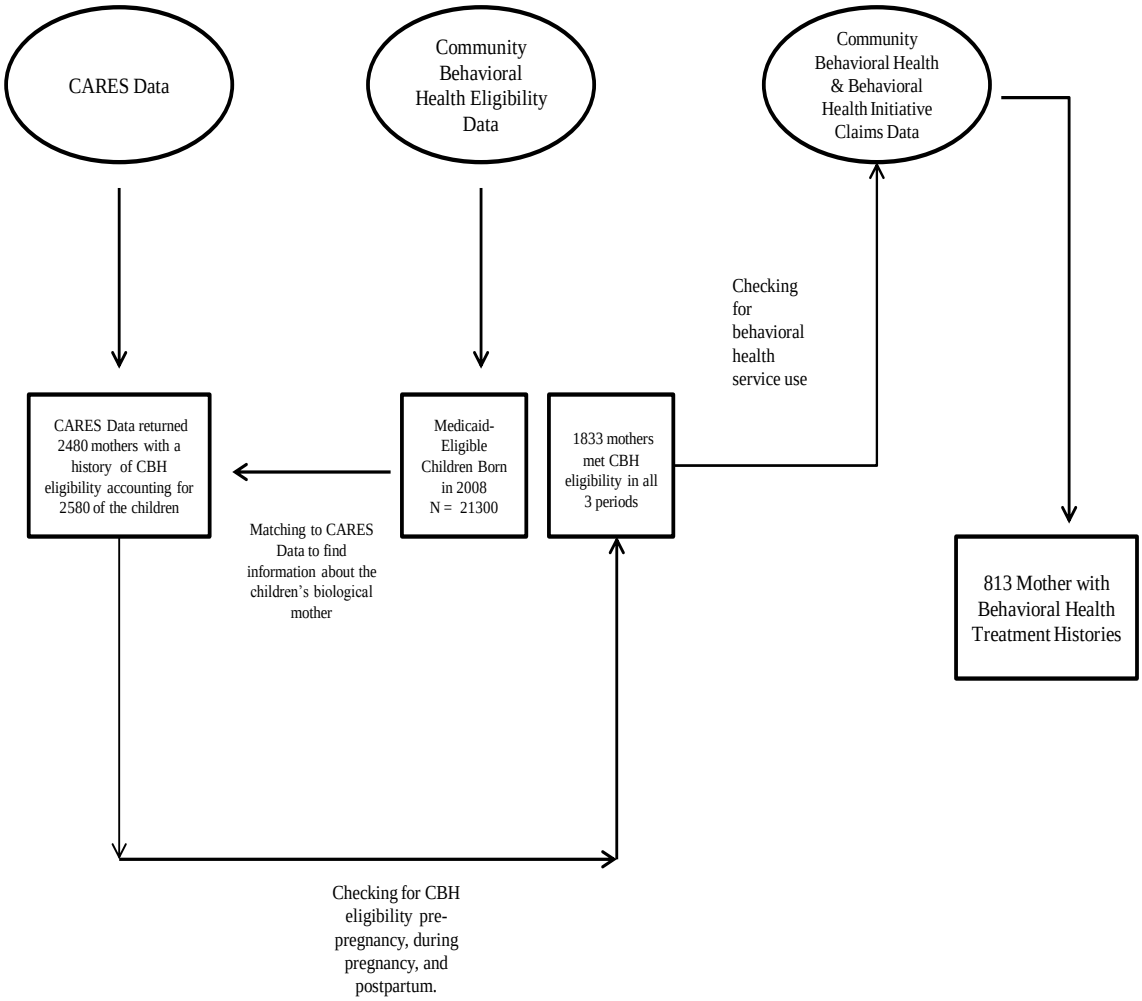

*Figure 3***:** Study Sample Selection Process

Of the 813mothers, 488 (60%) were Black, 171 (21%) were Hispanic, 144 (18%) were White, and 8 (1%) identified as being from Other racial/ethnic group. Age of the mothers ranged from 13 to 46 years, with an average age of 24 years (*SD* = 6.14). The number of children ranged from 0 to 11, with an average of 1.87 children (*SD* = 1.83)

Data Sources

Data for this quantitative retrospective cohort study were retrieved from Community Behavioral Health (CBH), the City of Philadelphia Department of Human Services (DHS), and the Philadelphia Behavioral Health Special Initiative (BHSI) administrative databases and included de-identified eligibility, enrollment, and claims data. CBH is a not-for-profit 501c (3) corporation contracted with the City of Philadelphia through its Department of Behavioral Health and Intellectual disAbility Services (DBHIDS) to manage the behavioral health Medicaid funds in Philadelphia County, Pennsylvania. CBH receives a per-member, per-month capitation fee from the Commonwealth of Pennsylvania Department of Public Welfare for providing behavioral health services to the entire Medicaid enrollee population (470,000) in Philadelphia County (Rothbard & Kuno, 2006; www.dbhids.org). CBH is the only organization wherein administrators can control access to behavioral health services through preauthorization of services, utilization review of services, and restrictions on the provider network (Rothbard & Kuno, 2006). CBH's provider network offers a continuum of specialized inpatient, outpatient, and school-based behavioral health services to children, adolescents, and adults.

CBH's administrative data are based on Medicaid eligibility, which are collected by the Commonwealth of Pennsylvania Department of Public Welfare, and furnished through the City of Philadelphia. The administrative data are derived from demographic information of Medicaid-eligible members and Medicaid claims submitted for services rendered. The claims source data follow the Health Insurance Probability and Accountability Act (HIPAA) standards for the electronic submission of data in the 837 Format (Community Behavioral Health, n.d.). The overall claims file contains approximately 60 million records across ten years for all historical members. CBH's administrative data contain the following information: (a) a member's demographic information (age, gender, race/ethnicity, social security number, and place of residence); (b) health insurance

status; (c) behavioral health provider, behavioral healthcare level of care, behavioral healthcare service start and end dates, units of behavioral healthcare service paid, and cost for each behavioral health service received; and (d) a member's primary or secondary diagnoses at the point of each Medicaid behavioral health service/claim.

The City of Philadelphia Department of Human Services (DHS) is the organization wherein administrators and staff provide and promote safety, permanency, and well-being for children and youth at risk of abuse, neglect, and delinquency through child protection, foster care and adoption, juvenile justice, and prevention services. The Philadelphia Behavioral Health Special Initiative (BHSI) is operated by the Philadelphia Mental Health Care Corporation (PHMCC). BHSI employees provide assessments, referrals, and funding support to the uninsured or underinsured with substance-related problems. Data sources and data of interest are presented in Table 1.

Table 1

Sources of Data

Data Source	Description of Data	Variables
CBH	Eligibility File Paid Claims Data	Predisposing (Race/Ethnicity; Age; Number of Children) Enabling (Medicaid Eligibility Category; Number of Days of Medicaid Eligibility) Evaluated Need (Primary DSM-IV-TR Diagnosis) Outcome Variable (Outpatient Use; Number of Outpatient Visits; Inpatient Use; Number of Inpatient Days)
DHS	Family Composition Client Matching and Validation	Predisposing (Number of Children)
BHSI	Paid Claims Data	Outcome Variable (Outpatient Use; Number of Outpatient Visits; Inpatient Use; Number of Inpatient Days)

Reliability and Validity

A benefit of using of administrative Medicaid claims data is that for the services reimbursed, there is a validation process embedded in the verification of the 837 claims data to assure the identities for those served match the Medicaid eligibility records from the Commonwealth of Pennsylvania. Because of financial incentives, moreover, some researchers have suggested that claim files are more likely to provide reliable services and procedure information than clinical and diagnostic data (Walkup, Boyer, & Kellermann, 2000). Additionally, CBH conducts compliance audits on its providers on a regular basis (at least yearly).

With respect to the validity of using a behavioral health diagnosis from Medicaid claims, a 2009 study conducted at CBH to determine the clinical characteristics and primary diagnoses of youth approved for a residential treatment facility (RTF) level of care revealed high diagnosis match rates between the referring evaluator and the clinical record reviewed by the CBH psychiatrist (intermittent explosive disorder: 90%, mood disorder: 87%, attention-deficit hyperactivity disorder:85%, oppositional defiant disorder: 85%, and conduct disorder: 82%) (George Gardiner, personal communication, March 23, 2010). Similarly, in another study to describe the rate of the Medicaid encounter data on diagnosis matched information in the medical record among a statewide sample of Medicaid children receiving behavioral health services, Knapp, Hurlburt, Kostello, Ladd, Tang, and Zima (2006) found high diagnosis match rates for attention-deficit hyperactivity disorder (98%), conduct disorder (89%), and mood disorder (89%). A validation study among Medicaid adults receiving treatment for schizophrenia (Lurie, Moscovice, Finch, Christianson & Popkin,1992, as cited in Crystal, Akincigil, Bilder, & Walkup, 2007) revealed 87% agreement between the administrative service records and the clinical record review by the psychiatrist.

Theoretical Framework and Research Hypotheses

Conceptually, this study was informed by the Behavioral Model of Health Services Use (Andersen, 1974; Andersen & Newman, 1973; Andersen, 1995). This study only utilized individual-level determinants for behavioral health service use.

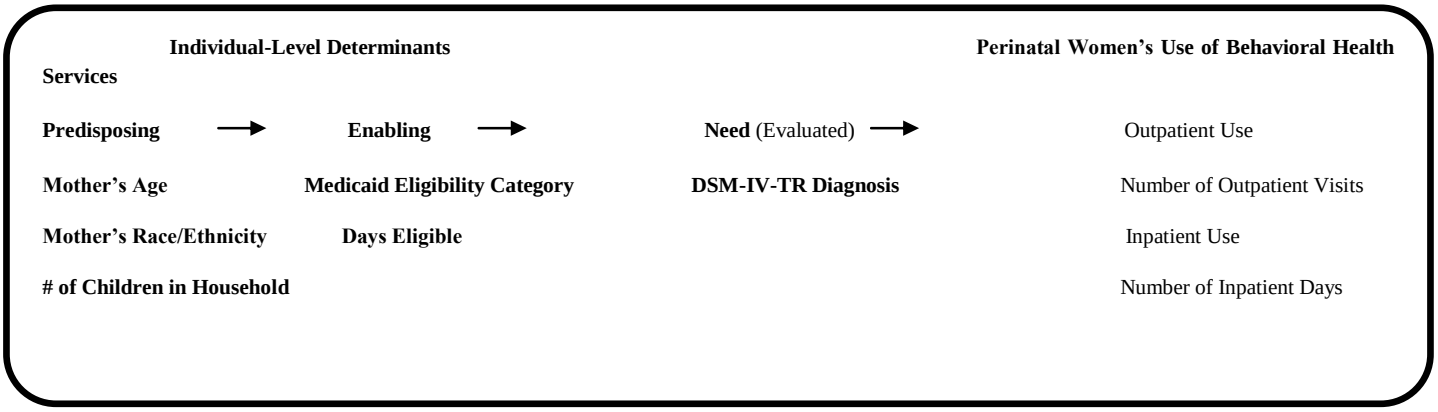

Figure 4: Conceptual Framework for Utilization of Behavioral Health Services among Medicaid-Eligible Women with Pre-Existing Psychiatric Disorders

Based on Andersen's (1974, 1995) Behavioral Model of Health Services Use and prior research, this study hypothesizes that need (evaluated need) factors will evidence a stronger effect than predisposing and enabling factors on outpatient and inpatient use (use vs. non-use) and on the number of outpatient visits and the number of inpatient (Andersen, 1995; Albizu-Garcia, Alegría, Freeman, & Vera, 2001; Elhia & Ford, 2007; Flaskerud & Hu, 1992; Katz, Kessler, Frank, Leaf, Lin & Eldund, 1997; Rosen Tolman &Warner, 2004; Song et al., 2004). Research questions and hypotheses on the effects of predisposing, enabling, and evaluated need factors are summarized as follows:

Research Question #1: Are individual predisposing (age, race, and number of children), enabling (Medicaid eligibility category and number of days of Medicaid eligibility), and evaluated need (a primary DSM-IV-TR diagnosis of attention deficit or disruptive behavior, substance-related, schizophrenia or psychosis, mood, anxiety, impulse control, or adjustment and co-occurring mental) factors associated with outpatient use (use vs. non-use) and the number of outpatient visits?

H_o: Outpatient use and the number of outpatient visits are independent of predisposing, enabling, and need (evaluated) factors.

H_a: Outpatient use and the number of outpatient visits are dependent upon at least one of the predisposing, enabling factors and need (evaluated need).

Research Question #2: Are individual predisposing (age, race, and number of children), enabling (Medicaid eligibility category and number of days of Medicaid eligibility), and evaluated need (a primary DSM-IV-TR diagnosis of attention deficit or disruptive behavior, substance-related, schizophrenia or psychosis, mood, anxiety, impulse control, or adjustment disorder) factors associated with inpatient use (use vs. non-use) and the number of inpatient days?

H_o: Inpatient use and the number of inpatient days are independent of predisposing, enabling, and need (evaluated) factors.

H_a: Inpatient use is dependent upon at least one of the predisposing, enabling factors and need (evaluated need).

Measures

Dependent Variables

The primary outcomes in this study were four types of behavioral health service use: (a) outpatient use; (b) inpatient use; (c) the number of inpatient visits; and (d) the number of inpatient days. These dependent outcome variables were operationalized as follows:

*Outpatient Behavioral Health Service Us*e**.** Outpatient service use was measured as a paid claim for at least one face-to-face outpatient contact in any of the following levels of care: psychiatric or drug and alcohol outpatient; intensive outpatient; partial hospitalization program; behavioral health rehabilitation services; or a Federally Qualified Health Center. This was a two level categorical variable (1 = Yes, 0 = No).

Inpatient Behavioral Health Service Use. Inpatient service use was measured as a paid claim for at least one inpatient contact in any of the following levels of care: crisis response center; a 23 –hour assessment bed; an inpatient acute/sub-acute unit; a crisis residence; an extended acute unit; a drug and alcohol detoxification unit; a psychiatric residential program (CRR, RTF-A, and RINT); or a drug and alcohol (short-term or long-term) rehabilitation. This was a two level categorical variable (1 = Yes, 0 = No).

*Number of Outpatient Visits***.** The number of unique visits at any of the following outpatient level of cares: psychiatric or drug and alcohol outpatient; intensive outpatient; partial hospitalization program; behavioral health rehabilitation services; or a Federally Qualified Health Center. This was count variable; that is, a non-negative integer equal to or greater than zero (≥ 0).

Number of Inpatient Days: Number of days in treatment in an inpatient level of care (crisis response center; a 23 –hour assessment bed; an inpatient acute unit; an inpatient sub-acute unit; a crisis residence; an extended acute unit; a drug and alcohol detoxification unit; a psychiatric

residential program [CRR, RTF-A, and RINT]; or a drug and alcohol [short-term or long-term] rehabilitation) pre-pregnancy, during pregnancy, or postpartum. This was count variable; that is, a non-negative integer equal to or greater than zero ($\geq$0).

Independent Variables

Individual-level independent variables were organized according to the Behavioral Health Model of Health Services Use (Andresen, 1995); that is, according to predisposing, enabling, and evaluated need factors.

Predisposing Variables

Race/Ethnicity. A woman's race/ethnicity was measured as self-reported on enrollment in Medicaid. In the original dataset, race/ethnicity was organized into five categories: 1= Black 2= Hispanic; 3 = White; 4 = Asian; and 5 = Other. Because of the small numbers in the Asian category (N = 1) and the Other category (N = 10), they were removed from the study and statistical analysis, leaving only three race/ethnic categories: 1= Black; 2 = Hispanic; and 3 = White. Previous studies utilizing administrative data support the validity of self-reported race and ethnicity variables for Black, White, and Hispanic (Waldo, 2005; Weech-Maldonado et al., 2003; Escarce & McGuire, 2003, as cited in Kozhimannil et al., 2011). For statistical analyses, Black women were used as comparison group for Hispanic and White women.

Age. Age was measured as the woman's age at time of delivery in years. This was a continuous variable.

Number of Children. Number of children was measured the number of children at the time of delivery on the DHS family composition file. This was a continuous variable.

Enabling Variables

Medicaid Eligibility Category. Medicaid eligibility category was measured according the CBH eligibility file. In the original dataset, Medicaid eligibility category was organized into five categories: 1 = General Assistance; 2 = Healthy Beginnings; 3 = Supplemental Security Income (SSI) with Medicare; 4 = Supplemental Security Income without Medicare; and 5 = Temporary Assistance to Needy Families (TANF), formerly Aid to Families with Dependent Children (AFDC) General Assistance. Because of the small numbers in the General Assistance (N = 27), Healthy Beginnings (N = 29), and Supplemental Security Income (SSI) with Medicare (N = 12) categories, they were collapsed into three Medicaid eligibility categories: 1= TANF; 2 = SSI without Medicare; and 3 = Other. For statistical analyses, TANF was used as comparison group for SSI without Medicare and White women.

Evaluated Need. Evaluated need was operationalized as a woman's primary *Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition, Text Revision* (*DSM-IV-TR*) of attention-deficit and disruptive behavior disorders, substance-related disorder, schizophrenia/psychotic disorder, mood disorder, anxiety disorder, impulse control disorder, or adjustment disorder submitted by a CBH provider one year prior to pregnancy. A woman was considered to have: (a) an attention-deficit/disruptive behavior disorder if her CBH claim file contained any of the following *DSM-IV-TR* attention-deficit and disruptive behavior codes: 314.01; 314.9; 312; 312.81; or 312.9; (b) a substance-related disorder if her file contained any of the following DSM-IV-TR substance-related codes: 303.90; 305.00; 304.40; 305.70; 304.30; 305.20; 304.20; 305.60; 304.50; 305.30; 304.00; 305.50; 304.80; 309.40; 304.60; 305.90; 304.10; 305.40; or 304.90; (c) schizophrenia or psychotic disorder if her CBH claim file contained any of the following *DSM-IV-TR* schizophrenia or psychotic disorder codes: 295.30; 2955.20; 295.90; 295.70; or 298.9; (d) a mood disorder if her

CBH claim file contained the any of following *DSM-IV-TR* mood disorder codes: 296; 296.2; 296.3; 300.4; 311; 296.0; 296.40; 296.4; 296.5; 296.7; 296.89; 296.80; or 296.90; (e) an anxiety disorder if her CBH claim file contained any of following *DSM-IV-TR* anxiety disorder codes: 300.01; 300.21; 309.81; 300.02; or 300.00; (f) an impulse control if her CBH claim file contained any of following *DSM-IV-TR* impulse control disorder codes: 312.34 or 312.30; and (g) an adjustment disorder if her CBH claim file contained any of following *DSM-IV-TR* adjustment disorder codes: 309.0; 309.24; 309.28; 309.3; 309.4; or 309.9.

In the original dataset, evaluated need was organized into seven categories: 1 = Mood Disorder; 2 = Substance-Related Disorder; 3= Schizophrenia/Psychotic Disorder; 4 = Attention Deficit Disorder; 5 = Anxiety Disorder; 6 = Impulse Control Disorder; and 7 = Adjustment Disorder. However, because the number in three of the diagnostic categories 9 was too small for statistical analysis (Figure 5), the categories were collapsed for analyses into 1= {any diagnosis of Mood Disorder; Schizophrenia/Psychotic Disorder; Attention Deficit Disorder; Anxiety Disorder; Impulse Control Disorder; or Adjustment Disorder} and 0 = Substance-Related Disorder diagnosis.

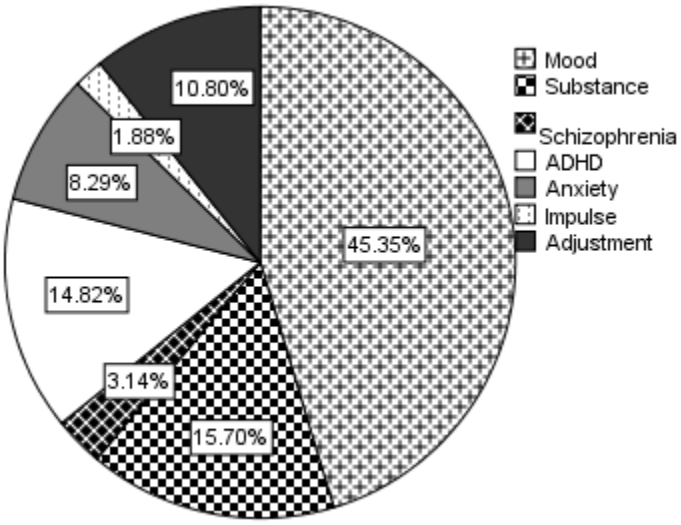

Figure 5: Distribution of DSM-IV-TR Diagnosis among Study Population

Visit Period. Visit period was treated as categorical independent variable, and was categorized into three distinctive periods: 1 = pre-pregnancy period (one year prior to pregnancy); 2 = pregnancy period (nine months prior to delivery); and 3 = postpartum period (one year after delivery). To account for the differences in the length of periods amongst the three periods, an exposure variable was created (Bruin, 2006). The exposure variable works automatically within the Statistical Package for Social Sciences (SPSS) Generalized Estimating Equation (GEE) model to place the data on an equal length time basis.

Data Analysis

Statistical analyses were performed using the IBM® Statistical Package for Social Sciences (SPSS) Version 20.0 (IBM Corporation, 2011).

Research Question #1: Patterns of Behavioral Health Service Utilization

Descriptive statistics were calculated to describe the demographic and clinical characteristics of the study cohort (N = 802) and to describe the patterns of behavioral health service utilization pre-pregnancy, during pregnancy, and the postpartum period. For categorical variables, frequencies and percentages were calculated, and for the continuous variables, means and standard deviations. For the latter, if the normality assumptions were not met, quartiles and the range were calculated to describe the patterns of behavioral health service use (Elhai, Calhoun, & Ford, 2007). Group differences were tested using (a) chi-square (χ^2) tests for independence when the independent and dependent variables were categorically coded and (b) negative binomial when the independent variables were categorical and the dependent variables were count coded.

Research Question # 2: Associations between Predisposing, Enabling, and Evaluated Need Factors and Outpatient Use (Use vs. Non-Use) and Number of Outpatient Visits.

To investigate the associations between individual predisposing (age, race, and number of children), enabling (Medicaid eligibility category and number of days of Medicaid eligibility), and evaluated need (a primary DSM-IV-TR diagnosis of attention deficit or disruptive behavior, substance-related, schizophrenia or psychosis, mood, anxiety, impulse control, or adjustment disorders) factors and outpatient use and the number of outpatient visits, two different regressions were estimated using Generalized Estimating Equations (GEE) (Zeger & Liang, 1986; Zeiger, Liang, & Albert, 1988). These included (a) a binary logistic regression to examine associations between predisposing, enabling, and evaluated need and outpatient use (use vs. non-use) and (b) a negative binomial with log link regression to examine associations between predisposing, enabling, and evaluated need and the number of outpatient visits (count variable). In both regression analyses, a

robust estimator covariance matrix and an exchangeable working correlation matrix were utilized, and in these two models, the main effects and the potential interactions between variables were examined.

Research Question # 3: Associations between Predisposing, Enabling, and Evaluated Need Factors and Inpatient Use (Use vs. Non-Use) and Number of Inpatient Days.

To investigate the associations between individual predisposing (age, race, and number of children), enabling (Medicaid eligibility category and number of days of Medicaid eligibility), and evaluated need (a primary DSM-IV-TR diagnosis of attention deficit or disruptive behavior, substance-related, schizophrenia or psychosis, mood, anxiety, impulse control, or adjustment disorders) factors and inpatient use and the number of inpatient days, two different regressions were estimated using Generalized Estimating Equations (GEE) (Zeger & Liang, 1986; Zeiger, Liang, & Albert, 1988). These included (a) a binary logistic regression to examine associations between predisposing, enabling, and evaluated need and inpatient use (us vs. non-use) and (b) a negative binomial with log link regression to examine associations between predisposing, enabling, and evaluated need and the number of inpatient visits (count variable). In both regression analyses, a robust estimator covariance matrix and an exchangeable working correlation matrix were utilized, and in these two models, the main effects and the potential interactions between variables were examined.

The GEE procedure is an appropriate analytical approach for this research study (Zeiger, Liang, & Albert, 1988; Diggle, Heagerty, Liang, & Zegger, 2002; Kleinbaum & Kelin, 2002), for unlike the standard maximum likelihood methods or generalized linear models typically employed, this semi-parametric model is more robust to uncertainty in the specification of covariance structure inherent

in the data and can accommodate a variety of distributions and samples with repeated measures (Zeiger, Liang, & Albert, 1988).

Institutional Review Board

This study was approved by the Institutional Review Boards (IRB) of the City of Philadelphia Department of Public Health (Appendix A) and the Drexel University College of Medicine (Appendix B).

CHAPTER 3

RESULTS

Descriptive Analyses

Age and Number of Children. The women's age at the time of delivery ranged from 13 to 46 years. The average age was 24.31 years (*SD* = 6.14). The number of children in the household at the time of delivery ranged from 0 to 11 children. The average number of children was 1.87 children (*SD* = 1.83). Means and standard deviations for the women's age and number of children in the household at the time they gave birth are presented in Table 2.

Table 2

Means and Standard Deviations for Women's Age and Number of Children at Birth

Variable	*M*	*SD*
Age at birth	24.31	8.14
Number of children at birth	1.87	1.83

Race and Ethnicity. Figure 6 shows the distribution of the study population by race and ethnicity. The majority of the women were Black (*n*= 487, 61%), followed by Hispanic women (*n*= 171, 21%) and White women (144, 18%).

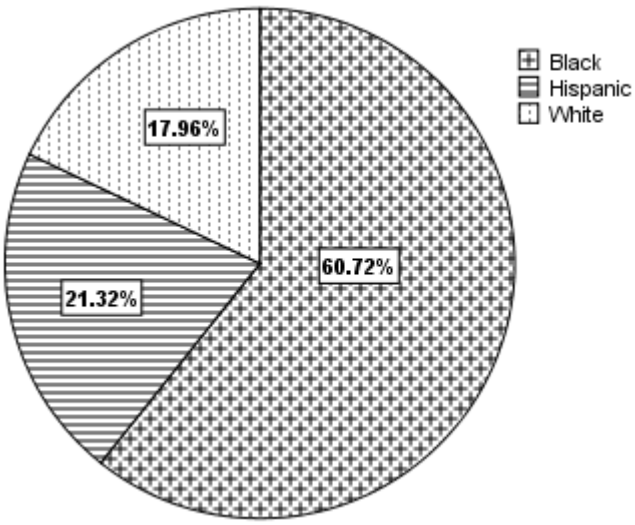

Figure 6: Distribution of the Study Population by Race and Ethnicity

Medicaid Eligibility Category. Frequencies and percentages were calculated for Medicaid eligibility category (Figure 7). The majority of the women were eligible for Medicaid via Temporary Assistance to Needy Families (TANF) (*n* = 566, 71%), followed by Supplemental Security Income (SSI) without Medicare (*n* = 143, 18%). The Other category (General Assistance, Healthy Beginnings, and Supplemental Security Income with Medicare) was (*n* = 93, 12%).

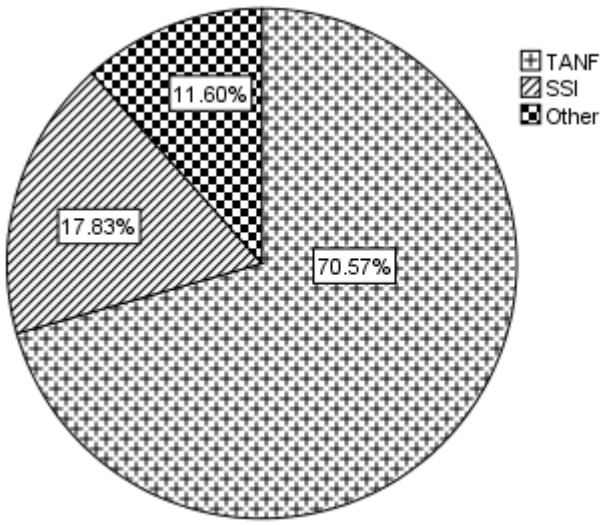

Figure 7: Medicaid Enrollment Patterns of the Study Population

Number of Days of Medicaid Eligibility. Means and standard deviations were calculated for the number of days of Medicaid eligibility one year pre-pregnancy, during pregnancy, and one year postpartum (Table 3). The average number of days of Medicaid eligibility at one year pre-pregnancy was 323.27 (*SD* = 86.02). This decreased to 251.81 (*SD* = 47.70) during pregnancy, and increased to 346.92 (*SD* = 51.55) one year postpartum. The difference in these mean values was found to be statistically significant, F (2, 2436) = 485, p <0.001, and may be attributed to the length of time. Whereas the pregnancy period is nine months, pre-pregnancy and the postpartum periods are twelve months.

Table 3

Means and Standard Deviations for Number of Days of Medicaid Eligibility

Number of Days of Medicaid Eligibility	*M*	*SD*
Days – one year pre-pregnancy	323.27	86.02
Days – during pregnancy	251.81	47.70
Days – one year postpartum	346.92	51.55

DSM-IV-TR Diagnosis. Frequencies and percentages were calculated for DSM-IV-TR diagnosis. The majority of study population had a mental health related diagnosis (*n* = 671, 84%) and 127 (16%) had a substance-related disorder. Percentages for DSM-IV-TR diagnosis are presented in Figure 8.

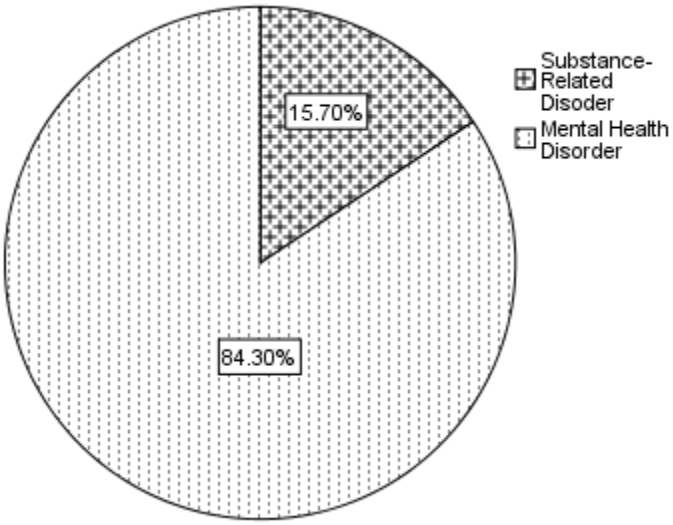

Figure 8: Distribution of DSM-IV-TR Disorders

Medicaid Eligibility by Race and Ethnicity. Frequencies and percentages also were computed for the Medicaid eligibility category by race/ethnicity (Table 5). A chi-square (χ^2) test for independence indicated that there were significant racial/ethnic differences in the distribution of Medicaid eligibility category, χ^2 (4) = 16.69, p = 0.002. Across all race/ethnic categories, eligibility for Medicaid via Temporary Assistance for Needy Families was most prevalent, but the percentage ranged from 65% (n= 93) for Whites to 73% (n= 356) for Blacks. For the Supplemental Security Income without Medicare category, the percentage ranged 15% (n= 22) for Whites to 23% (n=40) for Hispanics. For Other category, the percentage ranged from 8% (n= 14) for Hispanics to 20% (n=29) for Whites.

Table 5

Frequencies and Percentages for Medicaid Eligibility Category by Race/Ethnicity

Medicaid Eligibility Category	Black (N = 487)		Hispanic (N = 171)		White (N = 144)	
	n	(%)	*n*	(%)	*n*	(%)
Temporary Assistance to Needy Families	356	(73)	117	(68)	93	(65)
Supplemental Security Income without Medicare	81	(17)	40	(23)	22	(15)
Other	50	(10)	14	(8)	29	(20)

DSM-IV-TR Diagnosis by Race and Ethnicity. Frequencies and percentages were calculated for the DSM-IV-TR diagnosis by race/ethnicity (Table 4). A chi-square test (χ^2) for independence indicated that there were racial and ethnic differences in the distribution of psychiatric disorders, χ^2

(2) = 15.34, p <.001. Across all racial and ethnic categories, mental health related disorders were the most prevalent, but for Hispanic women, ranged from 81% (n= 81) for Whites to 94% (n=154) for Hispanics. For substance-related disorders, the percentage ranged from 6% (n=11) for Hispanics to 19% (n=28) for Whites.

Table 4

Frequencies and Percentages for DSM-IV-TR Diagnosis by Race/Ethnicity

DSM-IV-TR Diagnosis	Black (N = 482)		Hispanic (N = 170)		White (N = 144)	
	n	(%)	*n*	(%)	*n*	(%)
Mental Health Disorder	396	(82)	159	(94)	116	(81)
Substance-Related Disorder	86	(18)	11	(6)	28	(19)

Patterns of Behavioral Health Service Utilization Pre-Pregnancy, Pregnancy and Postpartum

Outpatient and Inpatient Behavioral Health Service Use. Figure 9 shows the proportion of women who utilized outpatient behavioral health services by period. More than half of the women (n = 410, 51%) used outpatient services pre-pregnancy, which decreased during pregnancy to 381(48%), and increased to 573 (71%) women postpartum. With respect to inpatient service use (Figure 10), only 153(19%) women used inpatient services pre-pregnancy, which decreased to only 82 (10%) women during pregnancy, and increased to141 (18%) postpartum. A chi-square (χ^2) test for independence indicated that the percentage of women utilizing some type of service showed a small but significant increase over time, χ^2 (2) = 7.26, p = 0.027.

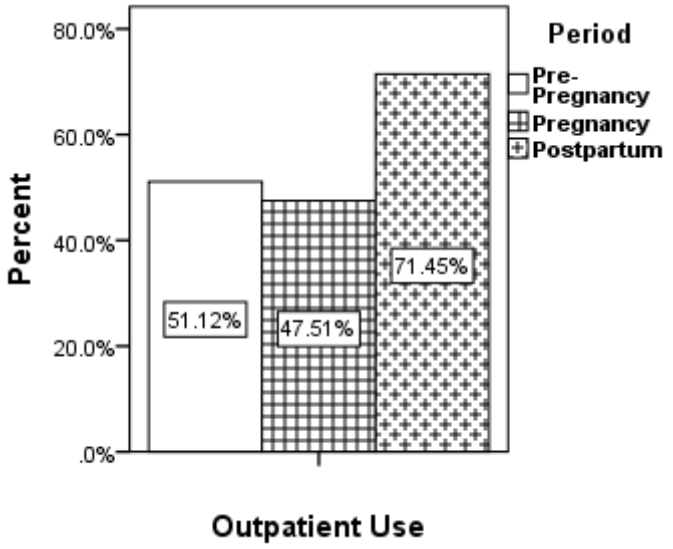

Figure 9: Percent Outpatient Use by Period

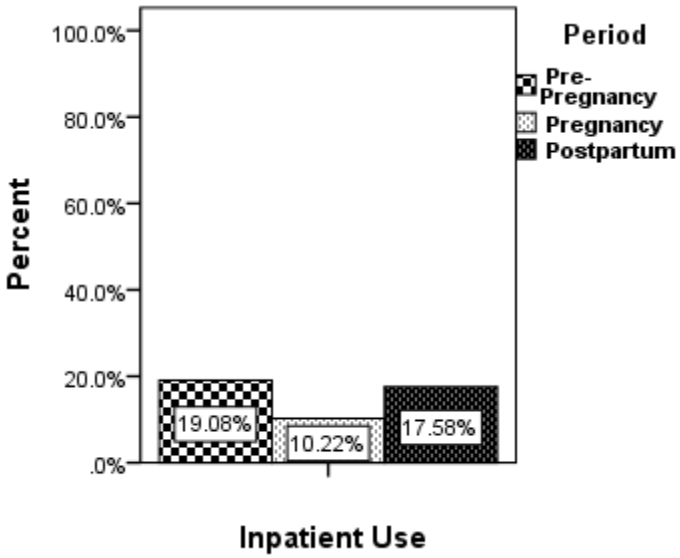

Figure 10: Percent of Inpatient Use by Period

Outpatient Use by Race and Ethnicity and Period. Frequencies and percentages were calculated for outpatient use by race/ethnicity and period (Table 6). Across all periods, Black women had the lowest rate of use (46% pre-pregnancy, 45% during pregnancy, and 69% postpartum), Hispanic women were higher (58% pre-pregnancy, 50% during pregnancy, and 74% postpartum), and White women had the highest rate of use (59% pre-pregnancy, 53% during pregnancy, and 76% postpartum). Statistically significant differences across racial/ethnic groups only were found in the pre-pregnancy period, χ^2 (2) = 10.24, p =0.007.

Table 6

Frequencies and Percentages for Outpatient Service Use by Race/Ethnicity and Period

Outpatient Use	Black (N = 487)		Hispanic (N = 171)		White (N = 144)		*P-value*
	n	(%)	*n*	(%)	*n*	(%)	
Pre-Pregnancy	226	(46)	99	(58)	85	(59)	0.007
Pregnancy	219	(45)	86	(50)	76	(53)	0.332
Postpartum	337	(69)	126	(74)	110	(76)	0.258

Outpatient Use by Medicaid-Eligibility Category and Period. Frequencies and percentages were calculated for outpatient use by Medicaid eligibility category (Table 7). Across all periods, women eligible for Medicaid via Temporary Assistance for Needy Families had the lowest rate of outpatient use (46% pre-pregnancy, 44% during pregnancy, and 71% postpartum), women eligible via Other category were higher (56% pre-pregnancy, 47% during pregnancy, and 64% postpartum), and women eligible via Supplemental Security Income without Medicare had the highest rate of use (69% pre-pregnancy, 62% during pregnancy, and 76% postpartum). Statistically significant

differences by Medicaid eligibility category were found pre-pregnancy, χ^2 (2) = 22.83, p <0.001, and during pregnancy, χ^2 (2) = 13.362, p = 0.001, but not during the postpartum period, χ^2 (2) = 3.76, p =0.153.

Table 7

Frequencies and Percentages for Outpatient Service Use by Medicaid Eligibility Category and Period

Outpatient Use	TANF (*N* = 566)		SSI (*N* =143)		Other (*N* =93)		P-value
	n	(%)	*n*	(%)	*n*	(%)	
Pre-Pregnancy	260	(46)	98	(69)	52	(56)	0.001
Pregnancy	249	(44)	88	(62)	44	(47)	0.001
Postpartum	404	(71)	109	(76)	60	(64)	0.153

Outpatient Use by DSM-IV-TR Diagnosis and Period. Frequencies and percentages were calculated for outpatient use by DSM-IV-TR diagnosis (Table 8). Women with a mental health-related diagnosis had higher rates of outpatient use pre-pregnancy (55%) and during pregnancy (50%), but women with a substance-related diagnosis had higher rates of use during the postpartum period only (85%). Statistically significant differences by DSM-IV-TR diagnosis were found across all periods: pre-pregnancy, χ^2 (1) = 22.96, p <0.001; during pregnancy, χ^2 (1) = 7.56, p = 0.006; and postpartum, χ^2 (1) = 12.61, p <0.001.

Table 8

Frequencies and Percentages for Outpatient Service Use by DSM-IV-TR Diagnosis and Period

Outpatient Use	Mental Health Disorder (*N* = 671)		Substance-Related Disorder (*N* = 125)		P-value
	n	(%)	*n*	(%)	
Pre-Pregnancy	369	(55)	39	(31)	0.001
Pregnancy	332	(50)	45	(36)	0.006
Postpartum	461	(69)	106	(85)	0.001

Inpatient Use by Race and Ethnicity and Period. Frequencies and percentages were calculated for inpatient use by race/ethnicity (Table 9). Across all periods, Hispanic women had the lowest rate of inpatient use (14% pre-pregnancy, 8% during pregnancy, and 15% postpartum), followed by Black women (18% pre-pregnancy, 10% during pregnancy, and 17% postpartum), and White women had the highest rate of use (28% pre-pregnancy, 14% during pregnancy, and 22% postpartum). Statistically significant differences were found only in the pre-pregnancy period, χ^2 (1) = 11.079, p =0.009, between Blacks and Whites, and between Whites and Hispanics.

Table 9

Frequencies and Percentages for Inpatient Service Use by Race/Ethnicity and Period

Inpatient Use	Black (*N* = 487)		Hispanic (*N* = 171)		White (*N* = 144)		*P-value*
	n	(%)	*n*	(%)	*n*	(%)	
Pre-Pregnancy	88	(18)	24	(14)	41	(28)	0.009
Pregnancy	49	(10)	13	(8)	20	(14)	0.128
Postpartum	85	(17)	25	(15)	31	(22)	0.456

Inpatient Use by Medicaid-Eligibility Category and Period. Frequencies and percentages were calculated for inpatient use by Medicaid eligibility category and period (Table 10). Across all periods, women eligible for Medicaid via Temporary Assistance for Needy Families had the lowest rate of inpatient use (16% pre-pregnancy, 10% during pregnancy, and 18% postpartum), women eligible via Supplemental Security Income without Medicare had higher rates (27% pre-pregnancy, 13% during pregnancy, and 14% postpartum), and women eligible via Other category had the highest rate of use (24% pre-pregnancy, 11% during pregnancy, and 19% postpartum). Statistically significant differences were found only in the pre-pregnancy period, χ^2 (2) = 10.22, *p-value* = 0.006, but not during pregnancy, χ^2 (2) = 1.19, *p-value* =0.533, or the postpartum period, χ^2 (2) = 1.63, *p-value* =0.444.

Table 10

Frequencies and Percentages for Inpatient Services Use by Medicaid Eligibility Category and Period

Inpatient Use	TANF (*N* = 566)		SSI (*N* =143)		Other (*N* =93)		*P-value*
	n	(%)	*n*	(%)	*n*	(%)	
Pre-Pregnancy	92	(16)	39	(27)	22	(24)	0.006
Pregnancy	54	(10)	18	(13)	10	(11)	0.533
Postpartum	103	(18)	20	(14)	18	(19)	0.444

*Inpatient Use by DSM-IV-TR Diagnosis and Period***.** Frequencies and percentages were calculated for inpatient use by DSM-IV-TR diagnosis and period (Table 11). Women with a mental health-related diagnosis had higher rates of inpatient use pre-pregnancy (21%) and during pregnancy (11%), but women with a substance-related disorder had higher rates of inpatient use postpartum (24%). Statistically significant differences were found between women with a mental health diagnosis and women with a substance-related diagnosis during the pre-pregnancy and postpartum periods, χ^2 (1) = 5.93, *p-value* = 0.015, and χ^2 (1) = 4.15, *p-value* = 0.042, respectively, but not during pregnancy, χ^2 (1) = 1.52, *p-value* = 0.218.

Table 11

Frequencies and Percentages for Inpatient Services Use by DSM-IV-TR Diagnosis and Period

Inpatient Use	Mental Health Disorder (*N* = 671)		Substance-Related Disorder (*N* = 125)		P-value
	n	(%)	*n*	(%)	
Pre-Pregnancy	139	(21)	14	(11)	0.015
Pregnancy	73	(11)	9	(7)	0.218
Postpartum	110	(16)	30	(24)	0.042

Number of Outpatient Visits

Number of Outpatient Visits by Period. Because the number of outpatient visits had substantial positive skews in their distribution, they were grouped according to quartile distributions (Elhai, Calhoun, & Ford, 2008) as follows: (a) Group 1: three or less visits; (b) Group 2: between three and twelve visits; (c) Group 3: between 12 and 35 visits; and (d) Group 4: greater than 35 visits. Among the study population (N = 802), approximately 27% (*n* =216) made three or less outpatient visits, 25% (*n* = 197) 3- 12 visits, 24% (*n* = 196) 12 -35 visits, and 24% (*n* = 193) 35 or more visits (Figure 11).

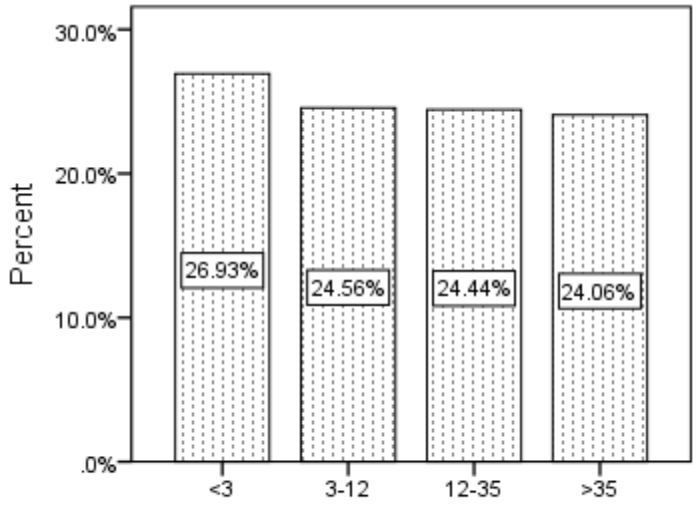

Figure 11: Number of Outpatient Visits among Study Population

Number of Outpatient Visits by Race and Ethnicity. Figure 12 shows the number of outpatient visits by race and ethnicity (Figure 12). Among the racial/ethnic groups, Blacks had higher rates of making three or less visits to an outpatient level of care (n = 155, 32%), followed by Whites (n = 79, 32%) and Hispanics (n = 28, 16%). Hispanics had higher rates of making between 12 and 35 visits (n = 52, 30%), and Whites had higher rates of making 35 or greater outpatient visits (n= 52, 36%). Statistically significant differences in the distribution of the number of outpatient visits by race and ethnicity were found, χ^2 (6) = 35.29, *p-value* < 0.001.

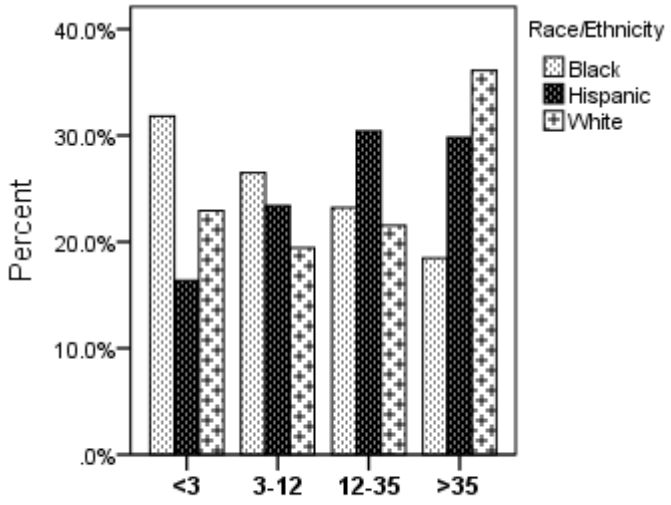

Figure 12: Number of Outpatient Visits Outpatient Visits by Race and Ethnicity

Number of Outpatient Visits by Medicaid Eligibility Category. Figure 13 shows the number of outpatient visits by Medicaid Eligibility Category. Women eligible for Medicaid via Temporary Assistance for Needy Families had higher rates of making three or less visits (*n* = 162, 29%) and between three and twelve visits (*n* =150, 27%) to an outpatient level of care. Women eligible via Other category had higher rates of making between 12 and 35 visits (*n* = 28, 30%). Women eligible via Supplemental Security Income without Medicare had the highest rate of making 35 or more visits to an outpatient level of care (*n* =46, 32%). Differences in the distribution of the number of outpatient visits by Medicaid eligibility category was statistically significant, χ^2 (6) = 13.01, *p-value* = 0.043.

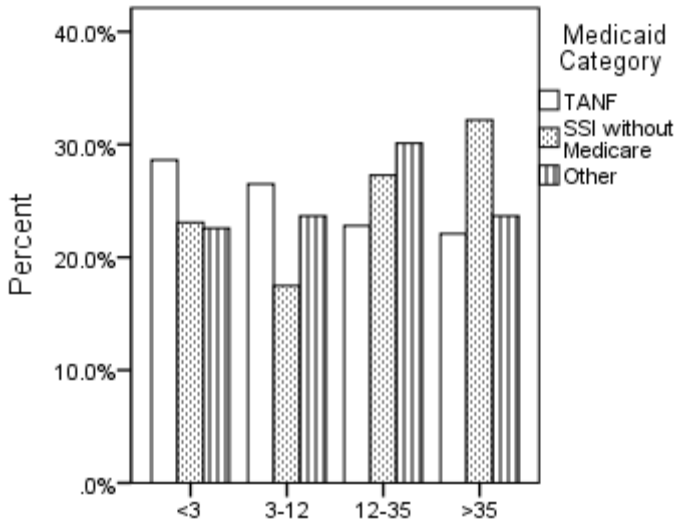

Figure 13: Number of Outpatient Visits by Medicaid Eligibility Category

Number of Outpatient Visits by DSM-IV-TR Diagnosis. Figure 14 shows the number of outpatient visits by DSM-IV-TR Diagnosis category. Women with a mental health-related diagnosis had higher rates of making three or less visits to an outpatient level of care (*n* =193, 29%), but women with a substance-related diagnosis had higher rates of making three to twelve visits (*n* = 33, 26%) and 35 or more visits (*n*=41, 33%). Differences in the number of outpatient visits by DSM-IV-TR diagnosis category was statistically significant, χ^2 (3) = 10.47, *p-value* = 0.015.

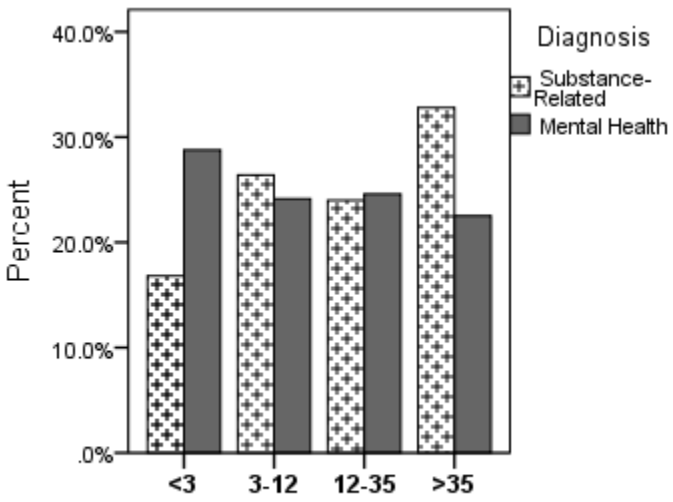

Figure 14: Number of Outpatient Visits Outpatient Visits by DSM-IV-TR Diagnosis

Number of Outpatient Visits by Location of Service and Period. Means, standard deviations, and the range were calculated for the number of outpatient visits pre-pregnancy, during pregnancy, and postpartum by level of care (Figure 15). Women made the most number of visits to an outpatient mental health program, an outpatient drug and alcohol program, and an intensive outpatient drug and alcohol. The average number of outpatient mental health visits was 3.44 (*SD* =7.23, *Range* = 50) at pre-pregnancy, which decreased to 2.63(S*D* =5.90, *Range* = 42) during pregnancy, and increased to 4.66 (*SD* = 8.70, *Range* = 59) postpartum. The average number of outpatient drug and alcohol visits was 1.60 (*SD* = 8.25, *Range* = 101) at pre-pregnancy, which increased to 1.80 (*SD* =8.36, *Range* = 109) during pregnancy and to 4.59 (*SD* = 13.29, *Range* = 99) during the postpartum period. The average number of intensive outpatient drug and alcohol visits was 1.58 (*SD* =8.11, *Range* = 96) pre-pregnancy, which increased to1.90 (*SD* =9.704, *Range* = 100) during pregnancy, and to 3.27 (*SD* =11.66, *Range* = 122) postpartum. Conversely, women made the least number of outpatient visits to a Federally Qualified Health Center (primary care clinic) across all periods.

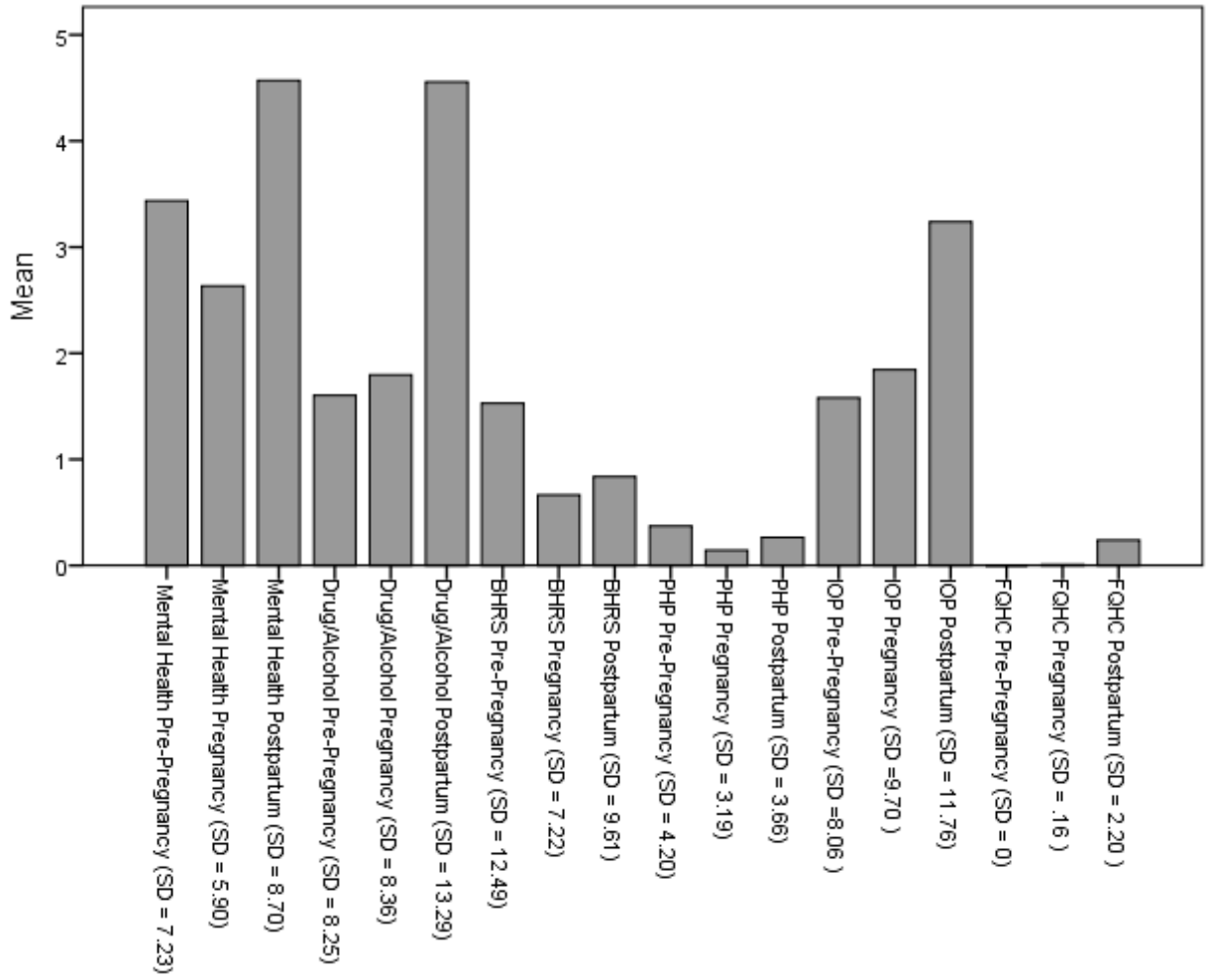

Figure 15: Mean Number of Outpatient Visits by Level of Care and Period

Number of Inpatient Days

Number of Inpatient Days. Because the number of inpatient days had substantial positive skews in their distribution, they were grouped according to quartile distributions (Elhai, Calhoun, & Ford, 2008) as follows: (a) Group 1: zero days; (b) Group 2: one to 10 days; and (c) Group 3: greater than 10 days. Among the study population (N = 802), approximately 65% (*n* =523) did not have any inpatient days, 17% (*n* = 139) 1-10 inpatient days, and 17% (*n* = 140) 10 or more visits (Figure 16).

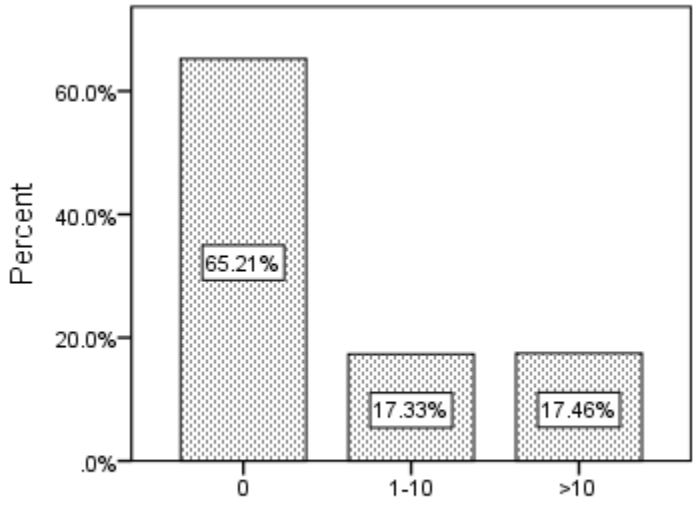

Figure 16: Number of Inpatient Days among Study Population

Number of Inpatient Days by Race and Ethnicity. Figure 17 shows the number of inpatient days by race and ethnicity (Figure 17). Among the racial/ethnic groups, Hispanics had higher rates of zero number inpatient days (*n* = 127, 74%), followed by Blacks (*n* = 317, 65%) and Whites (*n* = 79, 55%). Whites had higher rates of one to ten inpatient days (*n* = 33, 23%) and 10 or more inpatient days (*n*= 32, 22%). Statistically significant differences in the distribution of the number of inpatient days by race and ethnicity were found, χ^2 (4) = 14.66, *p-value* = 0.005.

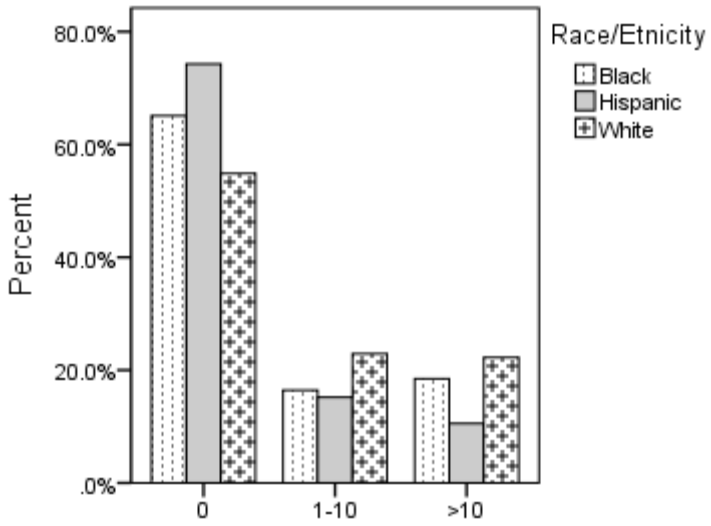

Figure 17: Number of Inpatient Days by Race and Ethnicity

Number of Inpatient Days by Medicaid Eligibility Category. Figure 18 shows the number of inpatient days by Medicaid Eligibility Category. Women eligible for Medicaid via Temporary Assistance for Needy Families had higher rates of having zero number of inpatient days (*n* = 375, 66%), followed by Women eligible via Supplemental Security Income without Medicare (*n*= 91, 64%) and women eligible via Other category (*n*= 57, 61%). Women eligible via Other category had the highest rates of having 10 or more inpatient days (*n*= 21, 23%). Differences in the distribution of the number of inpatient days by Medicaid eligibility category was not found to be statistically significant, χ^2 (4) = 2.89, *p-value* = 0.683.

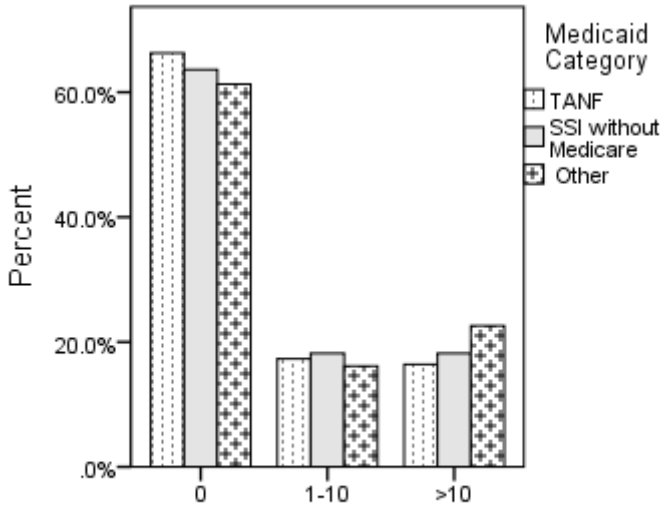

Figure 18: Number of Inpatient Days by Medicaid Eligibility Category

Number of Inpatient Days by DSM-IV-TR Diagnosis. Figure 19 shows the number of inpatient visits by DSM-IV-TR Diagnosis category. Women with a substance-related diagnosis had higher rates of zero (*n* =83, 66%) and 10 or more number of inpatient days (*n* =29, 23%), but women with a mental health related diagnosis had higher rates of having between one and ten inpatient days (*n* = 125, 19%). Differences in the number of inpatient days by DSM-IV-TR diagnosis category was statistically significant, χ^2 (2) = 6.81, *p-value* = 0.033.

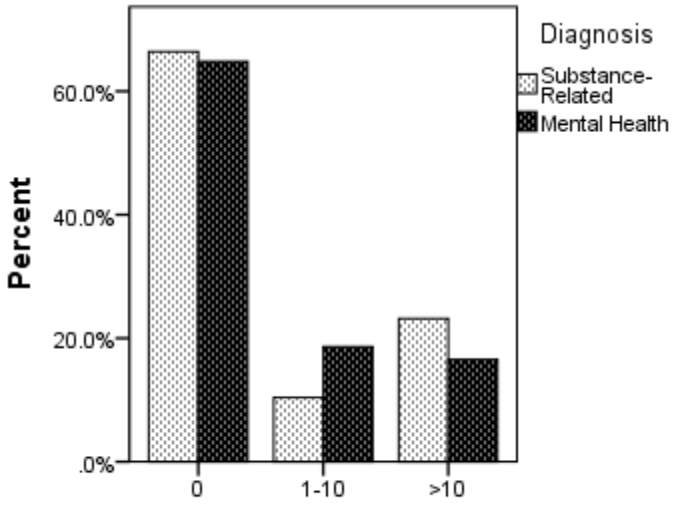

Figure 19: Number of Inpatient Days by DSM-IV-TR Category

Number of Inpatient Days by Level of Care and Visit Period. Means, standard deviations, and the range were calculated for the number of inpatient days pre-pregnancy, during pregnancy, and postpartum by level of care (Figure 19). During these three periods, women had the most number of inpatient days at a drug and alcohol rehabilitation program. The average number of inpatient days was 3.15 (*SD* =19.74, *Range* = 264) pre-pregnancy, which decreased to 1.53 (*SD* =15.331, *Range* = 222) during pregnancy, and increased to 6.95 (*SD* =32.64, *Range* = 295) postpartum.

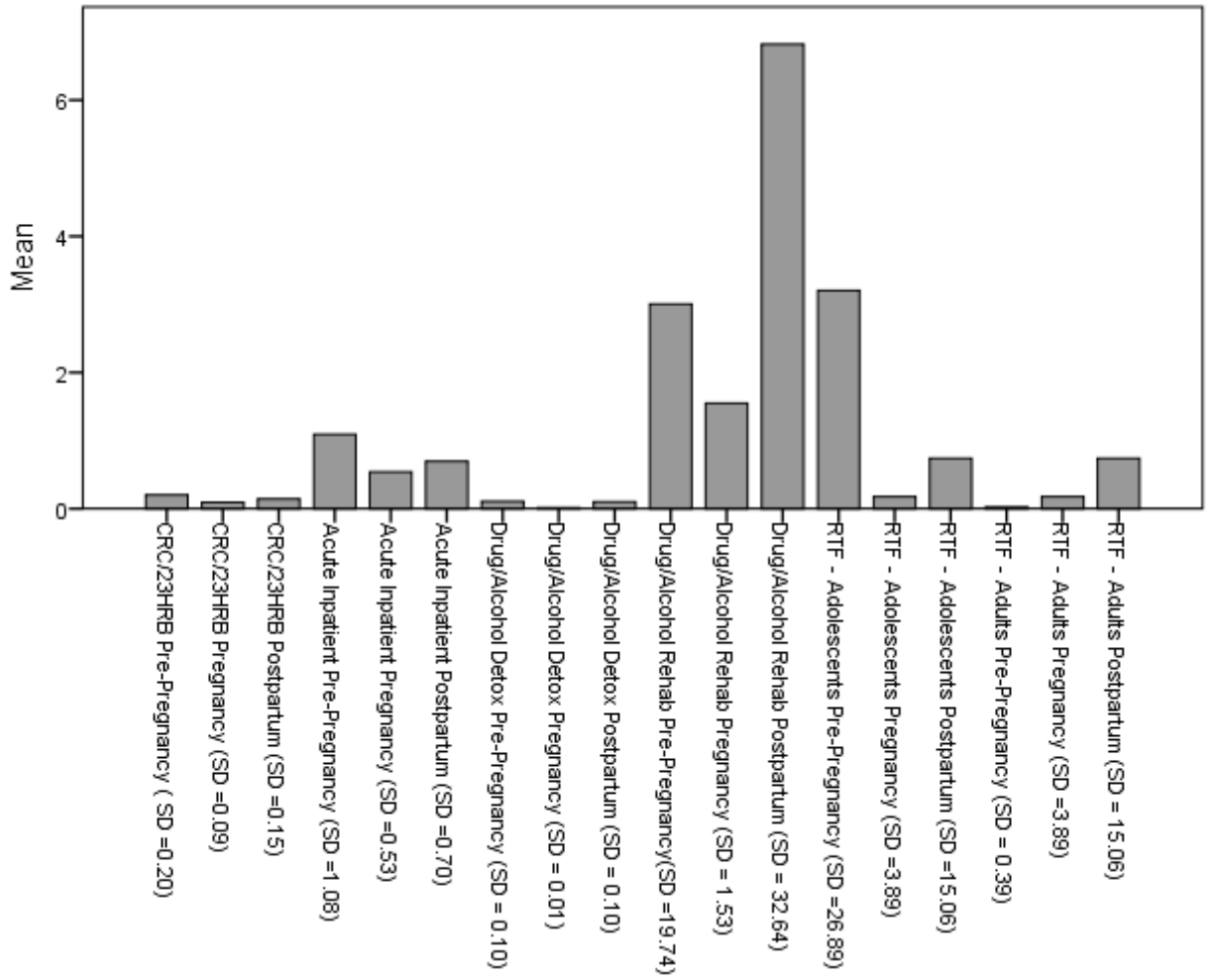

Figure 20: Means and Standard Deviations for Inpatient Visits by Level of Care and Period

The data described in this section suggest that during pregnancy, the use behavioral health services decreases, but it increases during the postpartum period. Racial/ethnic differences in the patterns of behavioral health service use and intensity of use also were observed. Although Black women comprised the majority of the study population (61%), in general, Black women had lower rates of service use and fewer visits across all periods.

Bivariate Analyses

Bivariate relationships between predisposing variables (woman's age at time of birth, race/ethnicity, and number of children in household at time of birth), enabling variables (Medicaid eligibility category and the number of days of Medicaid eligibility), and need variables (DSM-IV-TR diagnosis) with any outpatient or inpatient service use (use vs. non-use) and the number of outpatient visits or inpatient days were tested using generalized estimating equations (GEE), fitting a logistic and a negative binomial regression. Because visits to a behavioral health provider can be made over different periods, an exposure variable was included in the model to account for the differences in the length of periods (pre-pregnancy, pregnancy, and postpartum) (Bruin, 2006).

Bivariate analyses results indicated that race/ethnicity, age at time of delivery, Medicaid eligibility category, number of days of Medicaid eligibility, and DSM-IV-TR diagnosis were significantly associated with outpatient service use (yes vs. no). Race/ethnicity, age at time of birth, and the number of days of Medicaid eligibility were significantly associated with inpatient service use (yes vs. no). Race/ethnicity, the number of children at the time of delivery, Medicaid eligibility category and number of days of Medicaid eligibility were significantly associated with number of outpatient visits. The number of days of Medicaid eligibility and DSM-IV-TR diagnosis were significantly associated with the number of inpatient days. Results of the bivariate analyses are presented in Table 12.

Table 12

Preliminary Bivariate Analyses

	Outpatient Use (Use vs. Non-use)		Inpatient Use (Use vs. non-use)		Number of Outpatient Visits		Number of Inpatient Days	
	Wald χ^2	*p*	Wald χ^2	*p*	Wald χ^2	*p*	Wald χ^2	*p*
Predisposing Variables								
Race/Ethnicity	12.07	.002	12.26	.002	34.29	<.001	0.63	.732
Age	6.36	.012	2.45	.118	0.94	.331	1.14	.287
Number of children	0.24	.622	0.09	.768	3.33	.068	0.71	.399
Enabling Variables								
Medicaid eligibility category	21.39	<.001	3.17	.205	4.53	.103	3.27	.195
Number of days of eligibility	27.04	<.001	8.47	.004	1640.32	<.001	48.71	<.001
Need Variables								
DSM-IV-TR Diagnosis	7.33	.007	0.26	.613	0.51	.475	2.05	.152

Multivariable Analysis

Generalized Estimating Equations Binary Logistic Regression Outpatient Use (Use vs. Non-Use). A multivariable GEE binary logistic regression analysis was performed to assess whether the individual predisposing variables (woman's age at delivery, race/ethnicity, and number of children at time of delivery), enabling variables (Medicaid Eligibility category and number of days of Medicaid

eligibility), and evaluated need variables (DSM-IV-TR diagnosis) were associated with outpatient service use. A backward variable selection procedure was used to reduce the model to one in which only variables significant at 95% confidence level were included. Although the number of children was not found to be significant in the bivariate analysis (p = .622), it was entered in the multivariable analysis as the number of children has been associated with mental health service use in previous studies (Song, Sands, & Wong, 2004). The backward procedure yielded the following final model: predisposing (race/ethnicity and age); enabling (Medicaid eligibility category and number of days of Medicaid eligibility; evaluated need (DSM-IV-TR diagnosis); and visit period. The individual parameter estimates were then interpreted.

When controlling for all of the other significant variables, race/ethnicity was found to be significantly associated with outpatient use (White, χ^2 (1) = 11.57, *p-value* =0.001 and Hispanic, χ^2 (1) = 4.36, *p-value* =0.037. On average, compared to Black women, White women had 1.56 times higher odds of using outpatient services, and Hispanic women had 1.29 times higher odds of using outpatient services. Age was significantly associated with outpatient service use, χ^2 (1) = 7.86, *p-value* =0.005, suggesting that for a year increase in age, a woman's odds of using an outpatient service increased by a factor of 1.02. When controlling for the other variables, Medicaid-eligibility category was found to be significantly associated with outpatient use (Supplemental Security Income without Medicare, χ^2 (1) = 15.11, *p-value* = <0.001. On average, compared to women eligible for Medicaid via Temporary Assistance for Needy Families, women eligible via Supplemental Security Income without Medicare had 1.72 times higher odds of using an outpatient service. Conversely, eligibility for Medicaid via Other category was not found to be associated with outpatient use, χ^2 (1) = .373, *p-value* = 0.542. When controlling for other variables in the model, the number of days of Medicaid eligibility was significantly associated with outpatient service, χ^2 (1) = 19.80, *p-value* <

0.001, suggesting that for every one unit increase in the number of days of Medicaid eligibility, a woman's odds of using an outpatient service increased by a factor of 1.00. When controlling for the other variables, having a DSM-IV-TR Diagnosis was associated with outpatient use, χ^2 (1) = 4.86, *p-value* =o.028; on average, compared to women with a substance-related diagnosis, women with a mental health diagnosis had 1.28 times higher odds of using outpatient services. Finally, visit period was found to be significantly associated with outpatient use, χ^2 (2) = 934.35, p <0.001. Compared to the pre-pregnancy period, on average, women had 21.26 times higher odds of using an outpatient service during pregnancy, and 2.25 times higher odds during in the postpartum period. All parameter estimates are presented in Table 13.

Table 13

Parameter Estimates for Multivariable GEE Binary Logistic Regression Model - Outpatient Service Use

Variable	*B*	SE *(B)*	Exp *(B)*	95% CI	*p*
Predisposing					
Race Ethnicity (ref: Black)					
White	0.46	0.14	1.58	(1.22-2.07)	.001
Hispanic	0.24	0.11	1.27	(1.02-1.58)	.037
Age	0.02	0.01	1.02	(1.01-1.04)	.005
Number of Children	-0.03	0.03	0.97	(0.95-1.03)	.296
Enabling					
Medicaid Eligibility Category (ref: TANF)					
Other	0.93	0.15	1.10	(.815-1.48)	.542
SSI without Medicare	0.54	0.14	1.72	(1.31-2.26)	<.001
Number of days of Medicaid Eligibility	0.01	0.01	1.00	(1.002-1.004)	<.001
Evaluated Need					
DSM-TR-IV Diagnosis (ref: Substance)					
Mental Health-Related Disorder	0.25	0.11	1.28	(1.03-1.59)	.028
Period					
(ref: Pre-Pregnancy)					
Postpartum	0.81	0.12	2.25	(1.79 -2.84)	<.001
Pregnancy	3.06	0.10	21.26	(17.43-25.95)	<.001

Generalized Estimating Equations Negative Binomial Regression - Number of Outpatient Visits. A multivariable GEE negative binomial regression analysis was performed to assess whether predisposing variables (race/ethnicity, woman's age at time of birth, and number of children at time of birth), enabling variables (Medicaid Eligibility category and number of days of Medicaid eligibility), and evaluated need variables (DSM-IV-TR diagnosis) were associated with the number of outpatient visits A backward variable selection procedure was then used to reduce the model to one in which only variables significant at the 95% confidence level were included. Although age and the evaluated need variables were not significant in the bivariate analysis (*p-value* =0.331 and *p-value* =0.475, respectively), both variables were included in the multivariable analysis. Age has been found to be associated with mental health service use (Song, Sands &Wong, 2004), and evaluated need is the variable of interest as it tests the hypothesis the need factors have a stronger effect on the number of outpatient visits. In the backward variable selection procedure, only the following variables emerged as significant: predisposing (race/ethnicity); enabling (number of days of Medicaid eligibility); and visit period. The individual parameter estimates were then interpreted.

When controlling for all other variables, race/ethnicity was significantly associated with the number of outpatient visits (White, χ^2 (1) = 30.15, *p-value* < 0.001 and Hispanic, χ^2 (1) = 3.79, *p-value* =0.052). On average, the expected number of outpatient visits for a White woman was 2.29 times greater than the expected number for a Black woman. For Hispanic women, the expected number of outpatient visits was 1.28 times higher than Black women. The number of days of Medicaid eligibility also was significantly associated with the number of outpatient visits, χ^2 (1) = 32.11, *p-value* = <0.001, suggesting that for every one day increase in the number of days of Medicaid eligibility, the expected number of outpatient visits increased by a factor of 1.01. Similarly, when controlling for all other variables, visit period was found to be significantly

associated with the number of outpatient visits, χ^2 (2) = 813.16, *p-value* < 0.001. Compared to the pre-pregnancy period, women in the pregnancy period had 22.39 more outpatient visits and 1.47 more visits in the postpartum period. Evaluated need, our variable of interest, did not emerge as significant, χ^2 (12) = 3.496, *p-value* = 0.062. All parameter estimates are presented in Table 14.

Table 14

Parameter Estimates for Multivariable GEE Negative Binomial Regression Model - Number of Outpatient Visits

Variable	*B*	*SE B*	Exp*(B)*	95% CI	*p*
Predisposing					
Race/Ethnicity (ref: Black)					
White	0.83	0.15	2.29	(1.71 -3.08)	<.001
Hispanic	0.25	0.13	1.28	(0.98-1.64)	.052
Age	0.01	0.01	1.01	(0.99 -1.04)	.370
Number of Children	-0.47	0.34	0.95	(0.89-1.02)	.180
Enabling					
Medicaid Eligibility Category (re: TANF)					
Other	0.18	0.18	1.20	(0.85-1.70)	.300
SSI without Medicare	0.31	0.15	1.37	(1.02-1.85)	.038
Number of Days of Medicaid Eligibility	0.01	0.00	1.01	(1.003-1.006)	<.001
Evaluated Need (re: Substance-related disorder)					
Mental Health Disorder	-0.24	0.13	0.78	(0.61-1.01)	.062
Visit Period (ref: Pre-Pregnancy)					
Postpartum	0.36	0.09	1.43	(1.21-1.69)	<.001
Pregnancy	3.12	0.11	22.63	(18.13-28.25)	<.001

Generalized Estimating Equations Binary Logistic Regression Inpatient Use (Use vs. Non-Use). A multivariable GEE binary logistic regression analysis was performed to assess whether predisposing variables (race/ethnicity, woman's age at time of birth, and number of children at time of birth), enabling variables (Medicaid Eligibility Category and number of days of Medicaid eligibility), and evaluated need variables (DSM-IV-TR diagnosis) were associated with inpatient service use (use vs. non-use). A backward variable selection procedure was then used to reduce the model to one in which only variables significant at the 95% confidence level were included. Although age, the number of children, and DSM-IV-TR diagnosis were not found significant in bivariate analysis, they were included in the GEE binary logistic multivariable regression. Age and number of children have been associated with mental health service use in previous studies (Song, Sands & Wong, 2004), and evaluated need is our variable of interest, as it tests the hypothesis that need factors have a stronger effect than predisposing and enabling variables. The backward variable selection procedure yielded the final variables: predisposing (race/ethnicity), enabling (number of days of Medicaid eligibility), and time period. Evaluated need did not emerge as significant. The individual parameter estimates are interpreted below.

When controlling for all other variables in the model, race/ethnicity was found to be significantly associated with inpatient use (White category, $\chi^2(1) = 7.83$, *p-value* =0 .005). On average, compared with Black women, the odds of White women using an inpatient service were 1.57 times higher. Hispanic race/ethnicity was not found to be related to inpatient service use, $\chi^2(1) = 2.31$, *p-value* = 0.128. The number of days of Medicaid eligibility was also found to be significantly associated with inpatient use, $\chi^2(1) = 6.68$, *p-value* = 0.010, suggesting that for each one unit increase in the number of days of Medicaid eligibility, the odds of a woman using an inpatient service increased by a factor of 1.00. Similarly, when controlling when controlling for all

other variables, period was found to be significantly associated with inpatient use (pregnancy period, χ^2 (1) = 246.06, *p-value* < 0.001). On average, compared to the pre-pregnancy period, the odds of a woman using an inpatient service were 11.64 times higher during pregnancy. However, the postpartum period was not found to be significantly associated with inpatient use, χ^2 (1) = 1.81, -*value* = 0.179. All parameter estimates are presented in Table 15.

Table 15

Parameter Estimates for Multivariable GEE Binary Logistic Regression Model - Inpatient Service Use

Variable	*B*	*SE B*	Exp *(B)*	95% CI	*p*
Predisposing					
Race/Ethnicity (ref: Black)					
White	0.45	0.16	1.57	(1.15-2.16)	.005
Hispanic	-0.26	0.19	0.75	(0.52-1.09)	.128
Age	0.01	0.01	1.01	(0.99-1.04)	.281
Number of Children	0.00	0.04	1.00	(0.91-1.08)	.997
Enabling					
Medicaid Eligibility Category (re: TANF)					
Other	0.21	0.21	1.23	(0.82-1.85)	.313
SSI without Medicare	0.20	0.18	1.22	(0.85-1.73)	.275
Number of days of Medicaid eligibility	0.00	0.00	1.00	(1.001-1.004)	.010
Evaluated Need (re: Substance-related disorder)					
Mental Health Disorder	0.17	0.18	1.18	(0.83-1.69	.367
Period (ref: Pre-Pregnancy)					
Postpartum	-0.17	0.12	0.85	(0.67-1.08)	.179
Pregnancy	2.45	0.16	11.64	(8.56-15.81)	<.001

Multivariable Generalized Estimating Equations Negative Binomial - Number of Inpatient Days. A multivariable GEE negative binomial regression analysis was performed to assess whether predisposing variables (race/ethnicity, woman's age at time of birth, and number of children at time of birth), enabling variables (Medicaid Eligibility Category and number of days of Medicaid eligibility), and evaluated need variables (DSM-IV-TR diagnosis) are associated with the number of inpatient days. A backward variable selection procedure was then used to reduce the model to one in which only variables significant at the 95% confidence level were included. Although race/ethnicity, age, number of children, and DSM-IV-TR diagnosis were not found to be significantly associated with the number of inpatient days in the bivaraite analysis, they were included in GEE negative binomial multivariable analysis, as these variables have been associated with mental health service use (Elhai & Ford, 2007; Song, Sands & Wong, 2004). The backward variable selection yielded the following final model: enabling (number of days of Medicaid eligibility) and visit period. The individual parameter estimates were then interpreted.

When controlling for all other variables in the model, the number of days of Medicaid eligibility was found to be significantly related to the number of inpatient days, χ^2 (1) = 6.12, *p-value* =0.013. For each one unit increase in the number of days of Medicaid eligibility, the expected number of inpatient days increased by a factor of 1.00. Period was significantly related to the number of inpatient days (pregnancy period, χ^2 (1) = 66.03, *p-value* <0.001), suggesting that compared to the pre-pregnancy period, during pregnancy, women had 9.78 more inpatient days. The postpartum period was not found to be significantly related to the number of inpatient days, χ^2 (1) = 0.37, *p* =.543. All parameter estimates are presented in Table 16.

Table 16

Parameter Estimates for Multivariable GEE Negative Binomial Regression Model - Inpatient days

Variable	*B*	*SE B*	Exp *(B)*	95% CI	*p*
Predisposing					
Race/Ethnicity (re: Black)					
White	-0.18	0.27	0.83	(0.49-1.43)	.502
Hispanic	-0.44	-0.48	0.64	(0.25-1.66	.359
Age	0.30	0.02	1.03	(0.99-1.07)	.151
Number of Children	-0.13	0.09	0.88	(0.73-1.06	.169
Enabling					
Medicaid Eligibility Category (re: TANF)					
Other	0.22	0.34	1.25	(0.65-2.41)	.510
SSI without Medicare	-0.24	0.33	0.78	(0.41-1.50)	.462
Number of days of Medicaid eligibility	0.00	0.00	1.00	(1.001-1.007)	.013
Evaluated Need (re: Substance-related disorder)					
Mental Health-Related Disorder	-0.38	0.30	0.68	(0.38-1.22)	.194
Period					
Period (ref: Pre-Pregnancy)					
Postpartum	0.14	0.23	1.18	(0.74-1.78)	.863
Pregnancy	2.28	0.28	9.78	(5.64-16.96)	.026

Interaction Terms

Additionally, models considering the interaction of predisposing, enabling, and need variables with period were evaluated for significance. Only interaction terms significant at the 95% confidence level were considered.

Outpatient Use. In the GEE binary logistic regression model examining outpatient use, the interaction between age and visit period was found to be significant, χ^2 (2) = 16.77, *p-value* < 0.001. The odds of using outpatient services increases significantly as a function of a woman's age (Figure 20). For a year increase in age, the odds of using outpatient services increased by 9%.

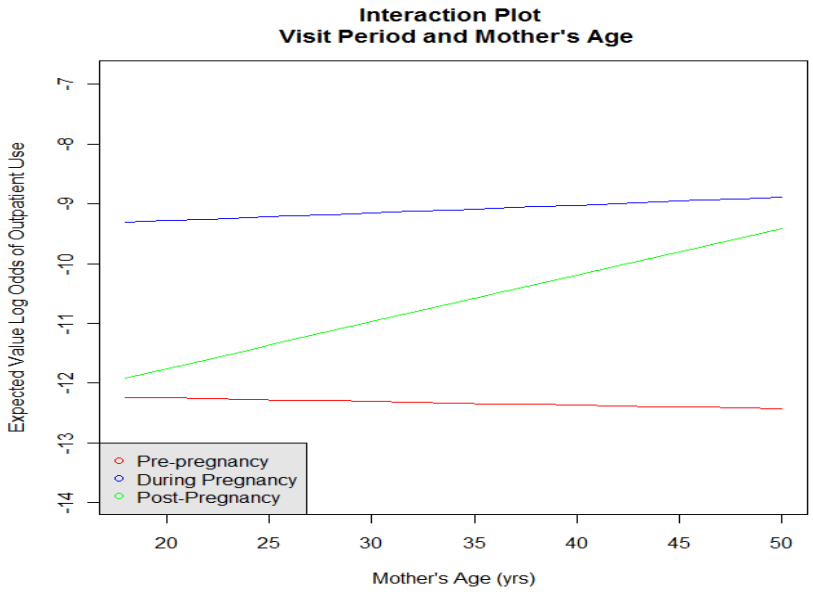

Figure 20: Outpatient Use: Interaction between Age and Period

The interaction between DSM-IV-TR diagnosis and visit period was found to be significant, χ^2 (2) = 23.30, $p < .001$ (Figure 21), suggesting that outpatient use as a function of diagnosis was

different for each period. Women with a substance-related diagnosis had lower odds of using outpatient services both pre-pregnancy and during pregnancy than women with a mental health-related diagnosis. However, this pattern reversed in the postpartum period, with women with a substance-related diagnosis having higher odds of outpatient services postpartum.

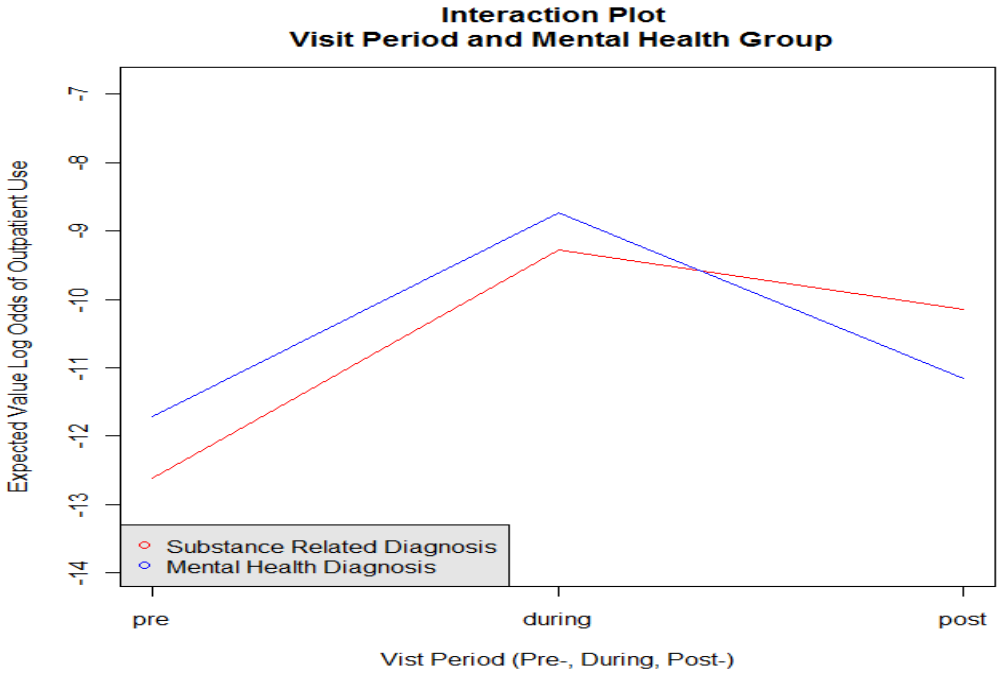

Figure 21: Outpatient Interaction between Diagnosis and Visit Period

Number of Outpatient Visits. In the GEE negative binomial regression model considering the number of outpatient visits, the interaction between DSM-IV-TR diagnosis and visit period was examined. The interaction was found to be significant, χ^2 (2) = 10.13, *p-value* = 0 .006. While the log number of visits for both groups of women decreased during the post partum period, the decrease was greater for women with a mental health related disorder than for women with a substance-related diagnosis (Figure 22).

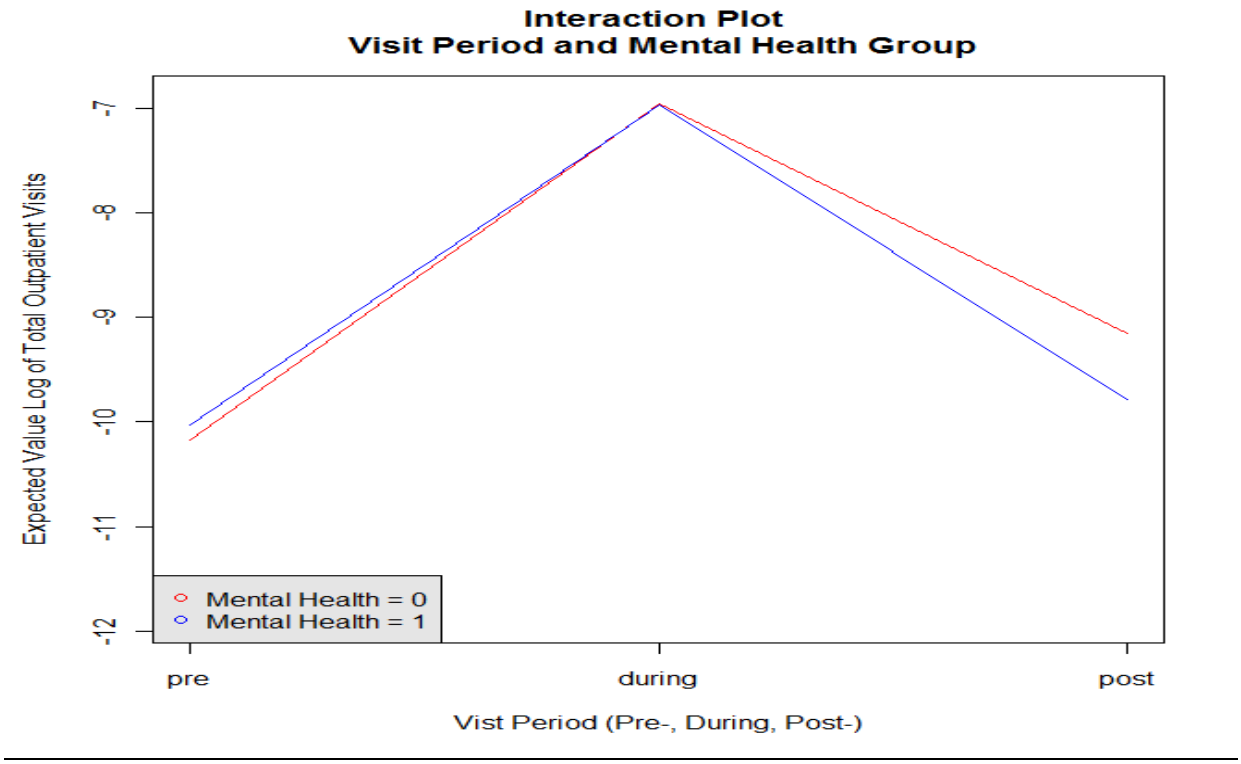

Figure 22: Interaction between Diagnosis and Visit Period – Number of Outpatient Visits

Inpatient Use. In the GEE binary logistic regression model examining inpatient use, when controlling for all the variables in the model at the same time, the interaction between time period and DSM-IV-TR diagnosis was found to be significant, χ^2 (2) = 11.822, *p-value* = 0.003 (Figure 23). Women with a substance-related diagnosis had lower odds of using inpatient services pre-pregnancy and during pregnancy, but had higher odds during the postpartum period.

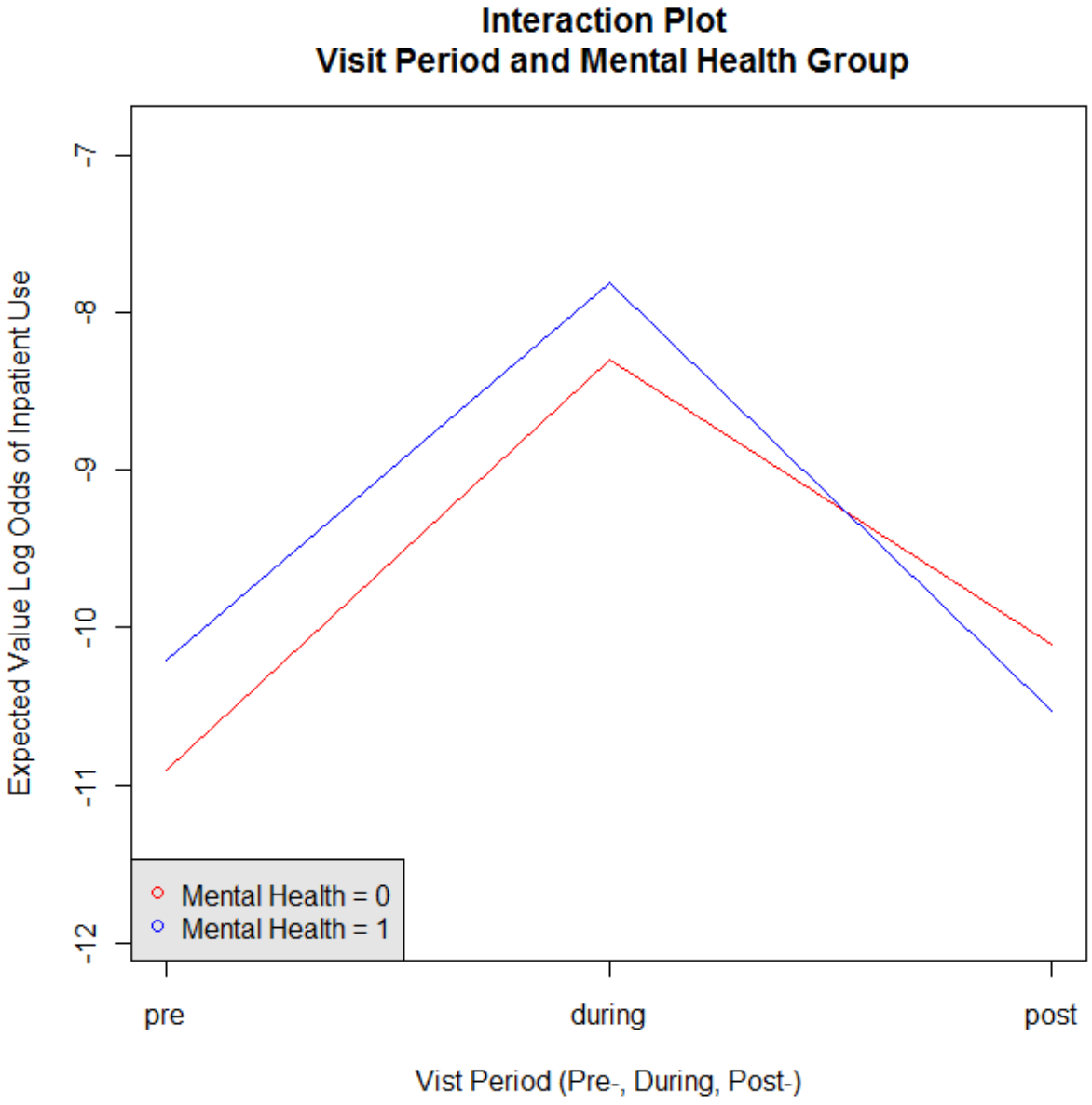

Figure 23: Inpatient Use Interaction between Diagnosis and Visit Period

Inpatient Days. In the GEE negative binomial regression model studying the number of inpatient days, when controlling for all the variables in the model at the same time, the interaction between time period and days of Medicaid eligibility was found to be significant, χ^2 (2) = 13.72, *p-value* = 0.001 (Figure 24), such that during pregnancy, an increase in days of Medicaid eligibility is

associated with a significant decrease in the log number of inpatient days. However, pre-pregnancy and during the postpartum period, an increase in days of Medicaid eligibility results in an increase in the log total of inpatient days.

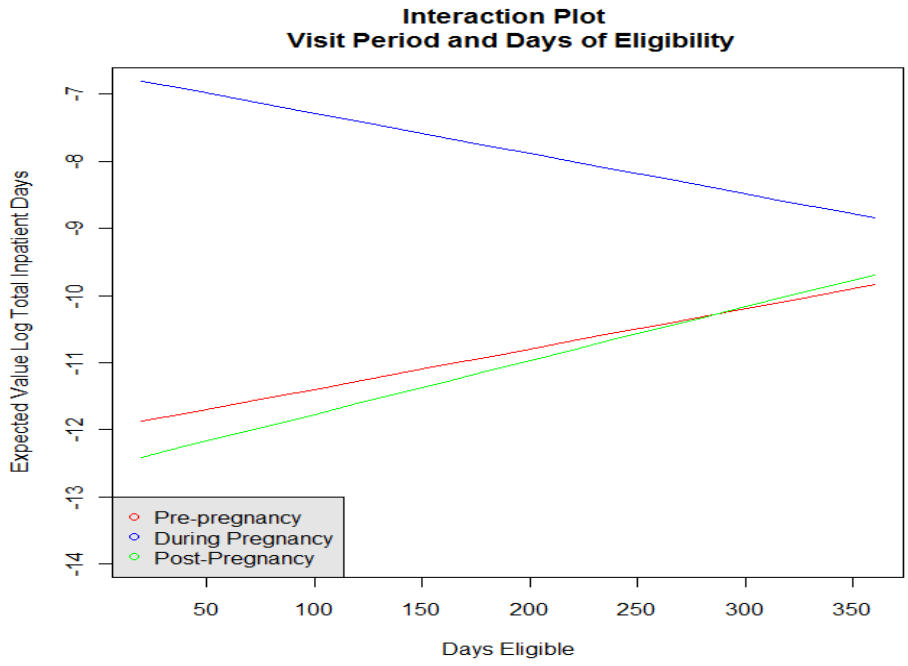

Figure 24: Number of Inpatient Days - Interaction between Diagnosis and Number of Days of Medicaid Eligibility

CHAPTER 4

DISCUSSION

This study examined the behavioral health service utilization patterns in a Medicaid managed care setting among a cohort of women with pre-existing psychiatric disorders and established behavioral health treatment in Philadelphia County, Pennsylvania, at three distinctive periods in their life cycle. This study also explored associations between predisposing, enabling, and evaluated need factors and outpatient and inpatient use (use vs. non-use) and intensity of use (number of outpatient visits and number of inpatient days) of behavioral health services. A discussion of both the descriptive and the multivariable results follows.

Discussion of Descriptive Results

Outpatient Use (Use vs. Non-Use). The proportion of women utilizing an outpatient level of care decreased during pregnancy, which is consistent with previous studies reporting that pregnancy significantly reduces or is disruptive to behavioral healthcare treatment (Benett et al., 2010; Kozhimannil et al., 2011). During the postpartum period, however, the proportion of women using an outpatient level of care exceeded pre-pregnancy levels (52% vs. 71%), which is inconsistent with previous studies reporting low levels of postpartum behavioral health treatment (Bennett et al., 2010; Song, Sands, & Wong, 2004; Kozhimannil et al., 2011), but consistent with studies of privately insured women (Dietz et al., 2007) and women with substance-related disorders (Wolfe et al., 2007). That this study population had comparable patterns of outpatient use postpartum to privately insured populations is interesting. One plausible explanation for the higher rates of outpatient use during the postpartum period is the increased risk for relapse or exacerbation of psychiatric symptoms and substance use during this period (Hendrick, 2010). Women, particularly women with severe

psychiatric disorders, may have relapsed or experienced a recurrence of symptoms. Additionally, because these women had established histories of psychiatric disorders, healthcare providers may have been closely monitoring them, particularly if they were being prescribed psychotropic medications. Another plausible explanation for the higher rates of outpatient use during the postpartum period is the woman's involvement with the Philadelphia Department of Human Services (DHS) or child protective services. The Medicaid-eligible women known to DHS are a subpopulation of the overall Medicaid-eligible population, and the patterns of behavioral health service use among this subgroup of women may be different. Since this was not a comparative study, my ability to interpret this finding is limited. An alternative explanation may be that the women were treatment stipulated by DHS or by the court system. Involvement with DHS or family court may have increased (facilitated) the probability of a woman using an outpatient level of care.

With respect to racial and ethnic differences in the use of an outpatient level of care, although the majority of the study population was Black (61%), and Black women were equivalent to White women in their rate of mental health disorders (82% vs. 81%) and in their rate of substance-related disorders (18% vs. 19%), their utilization of outpatient services for those disorders was lower across all periods. This finding is consistent with previous studies reporting lower rates of outpatient use among low-income perinatal minority women (Bennett et al., 2010; Song, Sands, & Wong, 2004; Kozhimannil et al., 2011), among previous studies focusing on medical service use among low-income minority women (Rosen et al., 2009). Interestingly, Hispanic and White women had similar rates of outpatient use across all periods, consistent with another study focusing on perinatal women with depression (Dr. Heather Flynn, personal communication, April 30, 2013). One plausible explanation for the lower rates of outpatient use among Black women is the women's prior experiences with the behavioral health system and services. Negative experiences with behavioral

health services have been associated with negative expectations about possible future use of mental health services (Thompson, Dancy, Wiley, Najdowski, Perry, Wallis. Mekawi, & Knafl , 2012; Leis et al., 2011; Thompson, Dancy, Wiley, Perry, & Najdowski, 2011).

Based on Medicaid eligibility category, women eligible for Medicaid via Supplemental Security Income (SSI) without Medicare had the highest rate of outpatient use across all periods. The higher rates of outpatient use by women eligible for Medicaid via this category may reflect a need or severity of psychiatric disorder. Disability is a potential path to eligibility for public health insurance, and a psychiatric disorder qualifies as a disability (Noonan, Carroll, Reichman, & Corman, 2010). To be eligible for SSI, a woman must "have a medically determinable physical or mental impairment" (www.socialsecuirty.gov). Conversely, the lower rates of outpatient use by women eligible via Other category during pregnancy and the postpartum period may be explained by the limited coverage of the program or seeking prenatal care late. Women eligible for Medicaid via Healthy Beginnings, for example, have continued coverage for only 60 days after the birth of a child (www.dpw.state.pa.us).

With respect to psychiatric diagnosis, women with a mental health-related diagnosis had higher rates of outpatient us pre-pregnancy and during pregnancy, but this pattern reversed during the postpartum period, where women with a substance-related diagnosis had higher rates of outpatient use. This finding is consistent with previous studies reporting a significant decrease in outpatient substance abuse services during pregnancy and an increase in outpatient substance abuse services during the postpartum period (Wolfe et al., 2007). One explanation for

Number of Outpatient Visits. During the study period, most women (27%) made three or less visits to an outpatient level of care. This finding is consistent with previous studies reporting a

decrease in the number of outpatient depression care visits (Bennett et al., 2010) and mental health visits (Song, Sands, & Wong, 2004) during pregnancy. While Black women were overrepresented in the three or less visits category, White women were overrepresented in the 35 or higher visits category. This finding is consistent with previous studies reporting a decrease in the number of outpatient depression care visits (Bennett et al., 2010) and mental health visits (Song, Sands, & Wong, 2004) during pregnancy and the postpartum period (Bennett et al., 2010; Kozhimannil et al., 2011), and in the general population (Olfson et al., 2004). One plausible explanation for the lower number of outpatient visits among Black women is the women's prior experiences with the behavioral health system. Negative experiences with behavioral health services have been associated with negative expectations about possible future use of mental health services (Thompson, Dancy, Wiley, Najdowski, Perry, Wallis. Mekawi, & Knafl , 2012; Leis et al., 2011; Thompson, Dancy, Wiley, Perry, & Najdowski, 2011).

Women eligible for Medicaid via SSI without Medicare had the highest rates of making 35 or more outpatient visits. Again, for the women eligible via SSI without Medicare, the higher numbers of visits may reflect a need or severity of the psychiatric disorder. Finally, with respect to DSM-IV-TR diagnosis, similar to outpatient use, women with a substance-related disorder had higher rates of making 3-12 visits and 35 or more visits, a finding consistent with previous studies reporting high levels of postpartum behavioral health treatment among women with substance-related disorders (Wolfe et al., 2007). One plausible explanation for the high rates in the number of outpatient visits among women with a substance-related diagnosis is that the women may have been treatment stipulated by DHS or the court system. Involvement with DHS or family court may have increased (facilitated) the probability of a woman making more visits to an outpatient level of care.

Inpatient Use (Use vs. Non Use). The proportion of women utilizing an inpatient level of care decreased during pregnancy and the postpartum period. Whites had higher rates of inpatient use across all periods; an interesting finding given that previous studies in the general population suggest that ethnic minorities, particularly Blacks, are overrepresented in psychiatric inpatients (Snowden, Wallace, Kang, Cheng, & Bloom, 2007) . Women eligible via SSI without Medicare had higher rates of inpatient use pre-pregnancy and during pregnancy, but women eligible via Other category had higher rates of use postpartum. Included in the Other category is General Assistance, which provided benefits to adults participating in drug and alcohol treatment. Perhaps the women were treatment stipulated.

Number of Inpatient Days. During the study period, most women (65%) did not access an inpatient level of care (number of inpatient days). A plausible explanation for this finding is that the women in this study may have been receiving behavioral health services at a less restrictive level of care (e.g., outpatient). Among the women who did access an inpatient level of care, White women, women eligible for Medicaid via Other category, and women with a substance-related diagnosis had 10 or more inpatient days. That women eligible for Medicaid via Other category had higher number of inpatient days is an interesting finding, and may reflect an unmet need secondary to limited access to health insurance. Women in this category were eligible for Medicaid via Healthy Beginnings or General Assistance, both of which have restrictions in coverage. With respect to the finding that women with a substance-related diagnosis had higher number of inpatient days, this finding is consistent with previous studies focusing on pregnant and parenting women with illicit substance use (Wolfe, et al., 2007).

Level of Care. Women received behavioral health treatment in a variety of outpatient and inpatient settings. With respect to the number of outpatient visits by level of care, interestingly,

women in this study had the least mean number of visits across all periods in a primary care setting (Federally Qualified Health Clinic), which is remarkable because pregnant and postpartum women have increased contact with the health care system, underscoring the need for coordinated care. With respect to the number of inpatient days by level of care, across all periods, women had the highest number of inpatient days at a residential treatment for adolescents, followed by a drug and alcohol rehabilitation program.

Discussion of Multivariable Results

Hypothesis #1. The first hypothesis examined the associations between predisposing, enabling, and evaluated need factors and outpatient use and the number of outpatient visits. For outpatient use, the data supported the research hypothesis; that is, that evaluated need was associated with outpatient use, consistent with previous studies (Elhai et al., 2009). In addition to evaluated need factors (psychiatric diagnosis), predisposing characteristics and enabling variables were associated with outpatient use. Among the predisposing factors, race/ethnicity (White and Hispanic) and age (older age) at time of delivery increased the odds of a woman using an outpatient level of care, which is consistent with previous studies examining disparities in mental health service use in a perinatal population (Song, Sands, & Wong, 2004). That race/ethnicity had an independent effect on outpatient use, even after controlling for insurance coverage and psychiatric disorder, suggests that disparities in behavioral health service use for Black women remain a critical issue in behavioral health care, particularly during a period of increased risk and vulnerability. The lower odds of outpatient use among Black women may reflect past experiences of racism and discrimination, a mistrust or negative perception of the mental health system (Copeland & Snyder, 2011; Leis et al., 2011), or lack of culturally competent mental health treatment (Copeland & Snyder, 2011). With respect to age increasing the odds of outpatient use, this finding may reflect maturity (for many,

older age may bring maturity) and an awareness of availability of services to cope with challenges (Song, Sands, & Wong, 2004). With respect to the enabling factors, this study found that Medicaid eligibility via SSI without Medicare and the number of days of Medicaid eligibility had a strong independent effect on outpatient use, underscoring the critical role Medicaid plays in facilitating and increasing access to behavioral health services for this vulnerable, low-income population. This supports prior evidence that health insurance coverage increases access to behavioral health (Harris, Carpenter, & Bao, 2006).

Additionally, for outpatient use, interactions with postpartum status were found for age and DSM-IV-TR diagnosis category. Older women in the postpartum period had higher rates of outpatient use, a finding consistent with a previous study (Song, Sands, & Wong, 2004). Women with a mental-health related diagnosis had a greater reduction in outpatient use, and women with a substance-related diagnosis had an increase in outpatient use, consistent with previous studies (Benett et al., 2010; Kozhimannil et al., 2011; Song, Sands, & Wong, 2004; Wolfe et al., 2007).

For the number of outpatient visits, the data partially supported the research hypothesis. Evaluated need (psychiatric diagnosis) was not associated with the number of outpatient visits, a finding inconsistent with previous studies (Elhai et al., 2009; Elhia & Ford, 2007). Among the predisposing factors, race/ethnicity (White race) was associated with higher number of outpatient visits, and among the enabling factors, the number of days of Medicaid eligibility. With respect to the former finding, this is consistent with previous studies reporting fewer visits by racial and ethnic minorities, particularly among Black women (Song, Sands, & Wong, 2004; Copeland & Snyder, 2011). Interactions with postpartum status were found for DSM-IV-TR diagnosis category and the number of outpatient visits, such that during the postpartum period, women with a mental health-

related diagnosis had a greater reduction in the number of outpatient visits, a finding consistent with previous studies (Benett et al., 2010; Kozhimannil et al., 2011; Song, Sands, & Wong, 2004).

Hypothesis #2. The second hypothesis examined the associations between predisposing, enabling, and evaluated need factors and inpatient use and the number of inpatient days. For inpatient use, the data partially supported the research hypothesis. Evaluated need was not found to be associated with inpatient use. With respect to predisposing factors, race/ethnicity (White race) was found to be significantly associated with inpatient use, suggesting disparities in service use among Black women. Additionally, interactions with postpartum status were found for DSM-IV-TR diagnosis category and inpatient use, such that during the postpartum period women with a substance-related disorder had a greater increase in inpatient use, a finding consistent with a previous study (Wolfe et al., 2007). The enabling factor, the number of days of Medicaid eligibility, was found to be associated with inpatient use. For the number of inpatient days, the data partially supported the research hypothesis. Only the enabling factor, number of days of Medicaid eligibility, was associated with the number of inpatient days.

The aforementioned findings suggest that, to an extent, the use or intensity of use of behavioral health services among this study population is not equitably distributed. Use of behavioral health services should not differ by factors other than need (evaluated or perceived need) (Adnersen, 1995; Andersen, 1974; Andersen & Newman, 1973), but in this study, use of behavioral health services differed by predisposing and enabling factors, highlighting an unmet need for behavioral health services, particularly for Black women. This unmet need suggests that the behavioral health system may not be meeting the service needs for perinatal Black women with mental health and substance abuse disorders.

Policy Implications

The findings of this study have policy implications that are important to public behavioral health systems, such as the City of Philadelphia Department of Behavioral Health and Intellectual disAbility Services (DBHIDS), and Medicaid managed care settings. First, this study supports prior evidence that health insurance coverage increases access to behavioral health services (Harris, Carpenter, & Bao, 2006). In this study, having health insurance via Medicaid was positively associated with behavioral health use and with the number of outpatient visits and the number of inpatient days. At the same time, this study found that equal access to health insurance coverage via Medicaid was not a robust factor in reducing or eliminating racial and ethnic disparities in behavioral health service use. In particular, this study found an unmet need for behavioral health service use among perinatal Black women, which is a public health concern given the deleterious effects of mental health and substance-related disorders on women, their offspring, and family (Cohen & Nonacs, 2005; Bloch, Rotenberg, Koren, & Klein, 2006; ACOG, 2008; Arnold, 2009; Grace, Evindar, & Stewart, 2003; Downey & Coyne, 1990; Weissman, 2006; Brunette & Jacobsen, 2006; Wisner, Scholle, & Stein, 2008). To mitigate the long-term negative effects of these disorders on women, their children, and families, and to reduce racial and ethnic disparities in behavioral health for this population, barriers to behavioral health treatment need to be explored and understood through qualitative approaches. Understanding barriers to behavioral health treatment among this high risk population is critical to designing effective interventions (Witt et al., 2011).

However, interventions aimed at reducing behavioral health disparities and improving access require multifaceted approaches (Cabassa, Zayas, & Hansen , 2006) and system-level changes, including the adoption of a public health approach with the integration of prevention and intervention efforts (Alegria, Atkins, Farmer, Slaton, & Stelk, 2010), the provision of comprehensive

and coordinated services, including the integration of behavioral health services in primary care clinics (e.g., obstetrics or pediatrics) or in social service agencies (home visiting programs[e.g., Healthy Start], child protective services, parenting classes) (Leis et al., 2011), and the provision of services by non-specialists (Segre, McCabe, Stasik, O'Hara, & Arndt, 2012). The aforementioned proposed approaches might be less stigmatizing and more acceptable, increasing the likelihood of reaching this population and of using behavioral health services (Leis et al., 2011; Segre et al., 2012).

Pregnancy, the postpartum period, and capitation (managed care) create windows of opportunity to intervene to enhance the health of women and their offspring and to tailor treatment. However, to maximize this window of opportunity, behavioral health services need to reflect the preferences, evolving needs, and life circumstances of perinatal women with psychiatric disorders, particularly the needs of low-income, racial and ethnic minorities (Segre, McCabe, Stasik, O'Hara, & Arndt, 2012; Alegria, Atkins, Farmer, Slaton, & Stelk, 2010; Flynn et al., 2010; Smith et al., 2009).

Limitations of the Study

This study has several limitations. First, this study was based on administrative data which is routinely collected for non-research purposes. Administrative data reflects only events that come to the attention of the system providing the data (Evan, Grella, Murphy, & Hser, 2008) and, as such, this study may have underestimated the number of women using behavioral health services. Women might have received services through private providers, providers outside the CBH provider network, outside the Philadelphia County, or outside the behavioral health system (e.g., faith-based organizations). However, this is unlikely, as CBH provides reimbursement for services rendered out- of- network and out-of-zone. Second, with respect to the generalizability of the findings, this study analyzed the patterns of behavioral health services delivered by providers in a Medicaid managed care setting in the County of Philadelphia, Pennsylvania, and among Medicaid-eligible women known to child protective services, and, therefore, may not generalize to other Medicaid populations or geographic regions, such as rural areas. Third, this study did not include a perceived need or an attitudinal-related variables, both of which are well documented factors in treatment seeking and adherence (Andersen, 1995; Elhai, Vorhees, Ford, Min, & Frueh, 2009; Katz et al., 1997). Consequently, it is unclear whether racial differences in behavioral health service use and in intensity of use across periods are due to perceptions of need, individual preferences or provider characteristics, for example.

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Appendix A: City of Philadelphia Institutional Review Board Approval

Appendix B: Drexel University College of Medicine Institutional Review Board Approval